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AZUSA PLANT

ASTRIONICS DIVISION

BUILDING BLOCK STUDY

A REPORT TO

**U.S. ARMY ELECTRONIC RESEARCH
AND DEVELOPMENT LABORATORY
FORT MONMOUTH, NEW JERSEY**

CONTRACT NO. DA 36-039 SC-85169
PROJECT NO. 3G89-01-001-01

FINAL REPORT:

PERIOD 1 APRIL 1962 TO 28 FEBRUARY 1963

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Report No. 2535

BUILDING BLOCK STUDY

Final Report

SIGNAL CORPS CONTRACT NO. DA 36-039 SC-85159
Project No. 3G89-01-001-01

1 April 1962 to 28 February 1963

SIGNAL CORPS TECHNICAL REQUIREMENTS

SCL-2101K, Technical Reports, 20 April 1959
SCL-4140A, Building Block Study, 8 December 1959

OBJECTIVES

The objectives of this program are to determine the specific test requirements of various types of military electronic equipment by the study of technical manuals or other related documents.


REPORT PREPARED BY

D. E. Rands

Report No. 2535

This final report is submitted in fulfillment of the Building Block Study,
Contract No. DA 36-039 SC-85159, Project No. 3G89-01-001-01, for the U.S. Army
Signal Research and Development Laboratory, Fort Monmouth, New Jersey.

Approved:


R. S. Magerle
Manager, Support Systems
Astrionics Division

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I. PURPOSE

The purpose of this program is to determine the detailed requirements for programmed, automatic field maintenance testing of all types of Army electronic prime equipments and systems. From a study of these data, the feasibility of utilizing the building-block concept in implementing these test requirements will be determined.

II. ABSTRACT

This study is concerned with the review of Army technical manuals and related documents to determine the requirements for an integrated effort to automate Army electronic equipment in the field. The program has been divided into two phases. The first phase covers a comprehensive review and tabulation of Army prime electronic equipment test parameters, and of associated test equipment parameters, coordinated into an evaluation of the capability of building block modules in testing these parameters more efficiently than with present test equipment. The second phase covers a less comprehensive review and tabulation of additional Army equipment, performed under redirection of the program, as a data collection both to illustrate the usefulness of the EAM system in general and to demonstrate the potential of the building-block module concept.

III. PUBLICATIONS, LECTURES, CONFERENCES AND REPORTS

A. PUBLICATIONS

None.

B. LECTURES

None.

III Publications, Lectures, Conferences and Reports (cont.)

C. CONFERENCES

On 6 September, 1962 a conference was held between Mr. Thomas M. Childs of USASRD, Ft. Monmouth, and Mr. Ralph Megerle of Aerojet-General Corp., Azusa. The purpose of the conference was to discuss and initiate changes in the technical scope of the Building Block Contract. The changes which resulted from that conference were drawn up and transmitted for formal approval by the U.S. Army Signal Research and Development Laboratories.

A conference was held on 9 February, 1962 at Aerojet-General Corp., Azusa, California for the purpose of reviewing the Aerojet facilities and the progress to date on the study program. The following conferees were in attendance:

From USASRD,

Mr. Thomas Child
Mr. Alex Rosenblum

From Aerojet,

Mr. Marvin Boatright
Mr. Harry Smith
Mr. Paul Burk
Mr. Bostwick Vinton

In view of the receipt of Proposal Request 62-RIG/D-9263, which is concerned with the continuation of the Building Block Study, plans for the continuation of the program were discussed. Specific charts and graphs, which indicated some of the study results, were presented to Mr. Childs and Mr. Rosenblum. These charts, and others, are reproduced in this final report.

Mr. Alex Rosenblum of USASRD visited Aerojet-General Corp., Azusa the week of 4 February, 1963 to review the program and make recommendations for the remaining work to be done on the contract, especially for the final report.

A general conference was held 7 February between Mr. Rosenblum and the Aerojet Support Systems personnel. The following results were agreed upon:

1. Preparation of the final report would begin immediately.
2. All tabulation of Air Force equipment would be discontinued.

III Publications, Lectures, Conferences and Reports (cont.)

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III Publications, Lectures, Conferences and Reports, C (cont.)

3. In lieu of the Air Force equipment, Mr. Rosenblum would supply, prior to the second week in March, data on newer Army Prime Equipments such as:

AN/GRC-50	AN/PRC-25
AN/GRC-66	AN/GRC-106
AN/VRC-12	

Contractually Aerojet was to deliver the following.

- a. Final Report
- b. EAM cards and print-out of all items tabulated.

Aerojet will send an engineer, if conditions permit, to USAELRDL to describe the tabulating system.

6. The following tentative time scale will followed.

- a. Conclusion of Engineering Services - 28 February 1963
- b. Additional study documents from USAELRDL - 7 March 1963
- c. Documentation system presentation - 23 April 1963
- d. Final Report, draft copies - 1 May 1963
- e. Approved Final Report - 10 June 1963.

D. REPORTS

In the performance of this contract, 22 monthly progress reports have been published, numbered LO447-01-1 through -22.

Also in the performance of the contract six quarterly reports have been published, numbered O447-01-1 through -6.

IV. FACTUAL DATA

A. ORIGINAL PHASE

The building block study program was initially a test requirement survey of prime electronic equipment and test equipment used by the Army, and use of the data thus found in illustrating the adaptability of automatic and

IV Factual Data, A (cont.)

semi-automatic building-block test modules to field testing. Additionally, the feasibility was to be proven with breadboard tests, and then preliminary design criteria drawn up for actual system modules. The preparation of an integrated testing system to perform field testing of the Army electronic equipment was the design goal, using building block test modules in automatic operation. This system was to employ programmed test input measurement criteria, controlled by pre-punched tape of IBM cards, which would automatically select the specific test point for measurement. Then the system would complete the test cycle by recording the measurement results on punched tape or actual print-out, thus furnishing a permanent record.

The development of the above-described integrated building-block test measurement system must be based on a comprehensive review of the measurement data and associated considerations of actual usage of the prime electronic equipment and the test equipment used by the Army in the field.

1. Nature of the Data Desired

The feasibility evaluation of the building-block module testing system logically begins with the testing characteristics of the prime electronic equipment. This information is best supplied from the Army's technical manuals, which were the basic source indicated for use in the program. The data from the manuals requires tabulation (Aerojet Form B511:61-1133 was drawn up) as a method to extract the data swiftly and accurately for automatic testing purposes and also as an aid in evaluation studies. For this reason the recording of the data from the work sheets to IBM cards provides an ideal storage and recall medium for automatic reference. The test parameters were broken into four categories: power requirements, trouble shooting, alignment, and final test. Also the test equipment list specified for maintenance of each particular piece of prime equipment was included.

The actual extremes of values to be measured and the accuracies required were to be tabulated. These measurements are (1) power in some multiple or fraction of watts, (2) current in amperes or fractional amperes,

IV Factual Data, A (cont.)

(3) voltage in some multiple or fraction of volts, (4) frequency in cycles or some multiple, (5) pulse time or pulse width in some fraction of seconds, and, (6) resistance and impedance in ohms or some multiple of ohms. It is understood that these measurements are to be taken of test points, or input or output terminals, etc. of the equipment and not of dismantled sections or individual components. The building-block testing system is conceived for use in field maintenance testing and would obviously be applied to system or whole unit tests.

The data obtained will be the basis for designing the test modules, both as to range and as to function. Also the data is necessary to furnish information on the overlap in the test equipment presently in use, which is important for efficiency and cost studies. Other factors need to be known, such as the relative number of each type of equipment in use, or population factor, and the complication of the measurements, or complexity factor.

2. Discussion of Basic Building Block Modules

The concept of building blocks as components of field test equipment, especially in the third and fourth echelons, is a sound one. The fabrication of basic modular oscillators, amplifiers, and voltage conditioners, plus suitable packaging them, will result in a reduction of field test equipment systems and also effect a modernization of such equipment. The minimizing of redundancy or overlap will result in a reduction of the total items of test equipment.

The establishment of firm criteria in the design of the modules provides a solution to the problem of redundancy in types of equipment.

In usage, the building blocks will feature maintenance based on unit independence. The failure of one building block will not effect the others in the integrated test setup. Interchangeability and replacement of faulty modules will be a simple plug-in operation. Also, the modules will feature high reliability through extensive use of solid-state circuitry, which will insure a minimum of module failures.

IV Factual Data, A (cont.)

The building-block systems are planned to be integrated assemblies of detachable test modules, designed to test some certain prime equipment types. The exact division of specific equipment to a certain building-block system of setup, and the division of measurement functions, would be dependent upon at least a completion of the preliminary design, which is beyond the scope of this program.

The automatic and semi-automatic features planned for the building-block system give the dual advantage of nearly foolproof testing and of furnishing a permanent test record. The automation is to be accomplished through the use of (1) programmed inputs by means of a pre-punched Mylar tape or equivalent tape-block reader (2) interface adapters to reconcile the test points with the test modules, and (3) digital print-out of the output and test point readings.

Figure 1 illustrates the block diagram of the modular concept in the automated test setup, drawn up in general form. Numerous modifications could be made to accommodate many test configurations. The necessary test setup and operating procedure for any maintenance test must be outlined in a revision to the appropriate technical manual.

In actual use, the correct building blocks will be selected for stimulus generation and response measurement, and then contact closures initiated by block readers would apply the test stimuli to the equipment. The resulting response would then be conditioned first to an analog voltage and then digitalized and entered into a comparator. The test limits in the comparator will have previously been set by the block reader information. The test results of the comparison will then be indicated and printed.

The programming indicated in the block diagram of Figure 1 may be either internal or external. Any automatic test configuration should have the ability to make use of the portable automatic data-processing developed for the Field Army. The FIELDATA Equipment Program has produced mobile, general-purpose digital computers such as the MOBIDIC, the BASICPAC, and the COMPAC.

IV Factual Data, A (cont.)

A self-contained, highly portable programming unit would perform the essential functions of test procedure operation and some limited trouble shooting. A larger external unit, however, would afford additional memory capability, and a greater potential for investigation of specific failures or additions to the testing program.

Application of the FIELDATA Equipment computer to the building block system would yield a design utilizing the 1-megacycle clock rate of the computer, and the 38-bit word length.

a. Modular Design Features

Basic criteria for the preliminary design of the building block system developed from the survey of 60 representative pieces of tactical electronic equipment. The derived data provided significant information concerning the types of modules and their indicated parameters.

The modular concept will incorporate standard types of equipment in the simplest form possible, as shown in the list of circuits below:

- (1) Single-stage voltage amplifiers
- (2) Oscillators
- (3) Rectifiers
- (4) Filters
- (5) Mixers
- (6) Modulators and demodulators
- (7) Pulse formers

With these basic circuits, plus essential special circuits, a test setup will be created. The various building blocks would be solid-state circuitry encapsulated for protection. The blocks might range in size from fractions of a cubic inch to several cubic inches, depending upon the function. The blocks could be combined into a specific test function by plugging into a function "drawer". This function drawer may be considered

IV Factual Data, A (cont.)

a prime module, and the plugged-in blocks as submodules. An illustration of a submodule application would be an oscillator for audio-frequency tests. The prime audio-oscillator module could accommodate a discrete number of frequency submodules, depending upon the test requirements. In this case, the prime module simply acts as a package to transfer power to the blocks and as an interface to carry signals to and from the various blocks as required.

Similarly, the voltage measurement module would accept a discrete number of voltage amplifiers. Factors such as the range and accuracy of the voltages to be measured, will determine the number of submodules required.

The complete battery of test requirements would be accommodated by the building block module system. The number and sizes of the modules would have to be established. Test procedures will undergo revision to match the new testing methods. For example, third- and fourth-echelon testing will, in many cases, no longer be concerned with wave shapes. Peak and half-power points, or other points of slope change, will be sampled and measured as voltages. Reasonable assurance that the wave shape is correct would be obtained through agreement of the sampled voltages with established limits. In the examination of an intermediate frequency amplifier bandwidth, for example, it is not necessary to examine the entire wave shape. The probability is that the frequency bandwidth between the half-power points and the voltage measurement at the peak will establish the operating characteristics of the amplifier.

Miniaturization techniques have been advancing rapidly. These new techniques will permit modules to be made smaller, thus approaching microminiaturization. It may be planned to adapt the smaller modules or submodules into the system in a manner to minimize obsolescence.

Certain pieces of test equipment are basic. Any plan to design test equipment into modules and effectively replace a variety of similar voltmeters, for example with a new standard design, should be well based on present intended usage and future projections, to warrant the redesign. The survey of test equipment in general Army use shows considerable overlapping

IV Factual Data, A (cont.)

of measurement functions. This redundancy can be largely eliminated in the design of the modules.

b. Modular Design Preparation for the RT-66/GRC

The designing of a building-block testing system requires an organized effort applied to a logical program. In this study the following six steps were developed for the preparation of the building block system:

(1) Project Planning

Preparation of detailed plans for the study effort and schedules for the task groups.

(2) Survey of subsystem requirements, where these are the areas or subsystems for survey.

- (a) Army Organization and Logistics
- (b) Programming and Automatic Controls
- (c) Test Instrumentation
- (d) Human Factors

(3) Subsystem Feasibility Investigations, according to the following:

(a) Detailed investigation of the feasibility of the concepts developed during the Survey of Subsystem Requirements in Step (2) above.

(b) Breadboard circuitry designed and tested for concept evaluation.

(4) Preliminary System Integration

(a) The tentative requirements generated in the Survey of Subsystem Requirements in Step (2) above, developed into a preliminary system concept.

IV Factual Data, A (cont.)

(b) Results of the breadboard circuitry tests in Step (3)b, above.

(5) System Application Exercise

(a) Feasibility evaluation of system concepts through theoretical analysis.

(b) Feasibility evaluation of system concepts through practical experiments with actual Signal Corps equipment. (The RT-66/GRC Receiver/Transmitter and its associated test equipment, per TML-289 was the first item of equipment chosen for this purpose).

(6) Summary of Final Requirements

(a) Evaluation of the preliminary work

(b) Statement of requirements for the automatic test system.

c. Technical Considerations in the Modular Design for RT-66/GRC Test Equipment

The analysis performed in the preparation of preliminary design criteria illustrated the technical considerations necessary in developing a building-block subsystem. The following two sub-sections, dealing with the test instrumentation subsystem firstly, and circuit design problems secondly, will clarify many of the considerations.

(1) Test-Instrumentation Subsystem Analysis

The "Test-Instrumentation Subsystem Study" covers advanced techniques for test instrumentation, and will determine the manner and agree to which the original requirements for test instrumentation are affected by these techniques. This report establishes many of the basic parameters for stimuli generation and response monitoring. This task has been divided into the following subtasks for circuit investigation:

Voltage conditioning

Dynamic Frequency Deviation

IV Factual Data, A (cont.)

Variable Reactance Oscillators
Radio-Frequency Power Measurements
Frequency Measurements
Distortion Measurements
Methods of Signal Switching

During the project planning phase, four areas of system investigation were defined as follows:

Interface with the Army FIELDATA System
Verification of the RT-66/GRC Final Test Procedures
Revised Test Procedure Verification
Final System Integration

(2) Circuit Design and Subtasks

The first step in determining the input-output goals for the test modules (as given in the subtasks for circuit investigation) is the detailed study of the methods now used for final testing of the RT-66/GRC. In general, the automatic testing will follow the basic procedures of the manual testing. Deviations are allowed in two cases. First, if it is unreasonably difficult, by automatic testing techniques, to perform a given measurement in the same manner as manual testing, different procedures should be investigated. Secondly, in those areas where the automatic equipment can perform desirable tests that are impossible with manual equipment, these tests should be added.

A list of tests has been prepared from the final test as given in TM11-289 (RT-66/GRC)

Physical Tests and Inspection
Sensitivity
Overall Selectivity
Limiting Action
Squelch Sensitivity
Regeneration and Audio Output

IV Factual Data, A (cont.)

R-F Power Output
Modulation
Frequency Comparison
Signaling Oscillator Frequency
Operational.

The key to the success or failure of the building-block concept for testing F-M communications equipment lies in the modular, programmable F-M signal generator. This is true for two reasons. First, it is evident that the advantages of using automatic testing are much greater in the testing of the receiver portion of the equipment than in the transmitter testing. The receiver testing can be made virtually fully automatic after a few simple preliminary adjustments are made. The transmitter, by its nature, will probably always require a certain amount of operator control. Secondly, the modular F-M signal generator replaces the AN/URM-48 which is the largest and most complicated single piece of test equipment used in the manual testing of the RT-66/GRC. For these reasons, the F-M signal generator was the first module investigated in this study program.

The requirements for the F-M signal generator can be stated quite simply as follows. The instrument must be capable of generating a 1 or 2 μ v of signal, modulated or unmodulated, at frequencies of 20.5, 23.5, 25.5, 27.5, 33.5, 36.5, 38.5, 46.5, and 52.5 mc. These frequencies will meet the requirements of RT-66/GRC, RT-67/GRC, and RT-68/GRC. The basic design must be capable of operating at all frequencies required by any F-M equipment of interest. The modulation is at 1000 cps with a deviation of 15 kc.

The design of any F-M signal generator is complicated by two conflicting requirements. First, the carrier frequency must be held to very small tolerances. Secondly, the frequency must be varied in accordance with the amplitude of the modulating frequency. A highly stable, crystal-controlled oscillator will satisfy the first requirement. It is, however, not possible to directly frequency-modulate a stable, crystal-controlled oscillator.

IV Factual Data, A (cont.)

Two basic schemes are used to generate F-M signals with high carrier frequency stability. The first of these uses phase modulation and the second uses direct frequency modulation. There is no difference between the signals generated by these two methods if the modulation is accomplished properly.

Phase modulation is the classical method for generating FM (this was the system used by Armstrong in the 1930's). There are two basic problems which generally complicate the design of a phase modulator. The first of these problems is caused by the fact that the output frequency of a phase modulation is affected by the modulating frequency as well as its amplitude. For this reason a corrective network is normally used. Since only one modulating frequency is used in the modular F-M signal generator, no corrective network is required. The second problem is caused by the relationship between linearity and modulation index in phase modulation. The maximum allowable modulation index with good linearity is 0.5. Modulation index is the ratio between the maximum frequency deviation and the minimum modulating frequency. For good linearity, therefore, the frequency deviation at the point of modulation must be less than half as great as the lowest modulating frequency. In a commercial transmitter, the lowest modulating frequency may be as low as 100 cps. The maximum frequency deviation may, therefore, be only 50 cps. Since the output frequency deviation must be 75 kc, the modulation must occur at a frequency 1500 times below the transmitter frequency. A great many frequency multipliers must therefore be employed. The requirements for the modular F-M signal generator are much less stringent on this point. The lowest, and only, modulating frequency is 1000 cps. This allows a frequency deviation of 500 cps. Since the output deviation is 15 kc, a factor of only 30 is required between the modulator and the output.

Direct frequency modulation is obtained by varying the frequency of an oscillator which is not crystal-controlled. In order to keep the carrier frequency within tolerance, the average output frequency is

IV Factual Data, A (cont.)

compared to that of a reference crystal-controlled oscillator. If the frequencies are not identical, a correcting voltage is fed back to the uncontrolled oscillator. There are two commonly used methods for obtaining frequency stability in direct frequency modulation. One of these is the Crosby, or discriminator, method; the other is the phase detector method.

The phase modulation system is preferable to direct frequency modulation in the modular F-M signal generator for two reasons. First, phase modulation is simpler and will require fewer components. This is particularly true because of the simple requirements of the modular F-M signal generator. Secondly, the linearity in the phase-modulation system is not dependent on any components. The linearity of the direct frequency-modulated system is dependent on the characteristics of the device which is used to vary the frequency as a function of voltage.

The tentative block diagram for the modular F-M signal generator is shown in Figure 2. Basically, the signal generator consists of two modules. One of these is common to all of the generators, no matter what the final carrier frequency might be. This module generates a 3.2-mc signal with a deviation of 15 kc at a modulation frequency of 1000 cycles. The other module is selected according to the test frequency required. Its output will also have a deviation of 15 kc at 1000 cycles.

An area of investigation recently initiated, apart from the RT-66/GRC, encompasses the use of diodes for signal switching. An example of a circuit to be breadboarded for a feasibility test is given in Figure 3. Any further work in this investigation should determine such parameters as:

- Maximum Signal Frequency
- Ideal Signal Termination
- Switching Speed
- Crosstalk
- Miniaturization

IV Factual Data, A (cont.)

The circuit illustrated (Figure 3) consists of two switching diodes back-to-back, CR-1 and CR-2. During the "OFF" condition the junction of the two diodes must be positive. A positive voltage is applied through a resistance to provide a low impedance path between the junction of the two diodes, and ground through diode CR-3. CR-3 is conducting and grounds any signal. The positive voltage also ensures that CR-1 and CR-2 are cut-off.

In the "ON" condition, a negative voltage is applied at the control point which is sufficient, to override the positive voltage and cause CR-1 and CR-2 to conduct and cut-off CR-3. The control voltage may come from a flip-flop or the contacts on a tape reader. By application of the proper control voltage, either input will appear at either output. The amplifiers indicated restore signal level, isolate, or provide impedance match.

d. Basic Test Equipment

The test equipment called out in the technical manuals for use in testing the 60 pieces of prime electronic equipment surveyed is graphed for frequency of usage in Figure 4. The data, reduced from the IBM cards, serves to aid in the basic test equipment requirements. The number of modules required to perform the high-occurrence measurements, for example, may be estimated from the bar graphs in Figure 4. Figure 5 gives the separate number of times the equipment was specified for troubleshooting, alignment, and final test.

The equipment which is fundamental to the maintenance of Army electronic equipment, consists basically of the 14 items listed below.

- (1) Vacuum tube voltmeter
- (2) Radio-frequency signal generator
- (3) Frequency meter
- (4) Vacuum tube, transistor, and diode tester

IV Factual Data, A (cont.)

- (5) Audio-frequency signal generator
- (6) Oscilloscope
- (7) Output meter (DBM)
- (8) Radio-frequency wattmeter
- (9) Panoramic indicator
- (10) Spectrum analyzer
- (11) Pulse generator
- (12) Noise and distortion meter
- (13) Sweep generator
- (14) Pulse counter.

The 14 items above would not each become a building block module. Automatic testing represents an advanced concept. Digital test techniques have to be employed, replacing or supplementing analog test devices, and the test modules will vary significantly, for this reason alone, from the conventional test equipment.

- (1) High-Input-Impedance Voltmeters, or Electronic Multimeter

These devices measure alternating and direct-current voltages and d-c resistances. The ranges required may be summarized as follows:

A-C Voltages:	0.05 to 1000 volts, frequencies of 30 cycles to 5 megacycles
D-C Voltages:	0.05 to 2500 volts
Resistances:	1 ohm to 50 megohms

These ranges were based on the tabulated data of the equipment under study. Accuracy for the measurements is nominally plus or minus 10%. Therefore, a system accuracy of plus or minus 3% will suffice. The input impedance should be as high as practical over all ranges.

Analysis of electronic circuitry reveals that the measurement of d-c voltages is accomplished by d-c amplifiers, with precision

IV Factual Data, A (cont.)

attenuated input at a high impedance, and low-impedance outputs driving a meter movement (0 to 1 milliamp). Since the modular conception of test equipment design visualizes the information being converted to a digital or binary-coded decimal for inline readout and printout, meters of the D'Arsonval type requiring a low-impedance source are not used.

The electronic multimeter, under these conditions, is reduced to a linear voltage amplifier, the output of which is an analog voltage, digitized for comparison and readout. In its simplest sense, such an amplifier is only a signal conditioner and the range of voltages it may condition is limited only by the accuracy requirements and the linear range of the amplifier module. This module becomes a compact package constructed entirely of solid-state devices.

(2) R-F Signal Generation

The Building Block Study, after the data on the various frequencies used in testing were reduced, revealed certain discrete frequencies most often used. Figures 6 and 7 list these frequencies. The modular concept, as applied in this instance, defines a signal generator which is a set of solid-state oscillators, crystal-controlled where required. Each oscillator building block will cover a practical group of frequencies. The output of these modules is programmable, and is flexible enough to meet all equipment requirements. Specific intermediate frequencies would be simple crystal-controlled oscillators such as 455 kc and 4.3 mc. Mid-band test frequencies would be selected to cover as many pieces of equipment as possible.

The output of these oscillators could be applied with variable attenuation, either to the antenna of a specific receiver (or some other test point within the receiver), or mixed with the attenuated output of a transmitter.

The frequency to be measured should be mixed with a known frequency, and the difference frequency processed through a counter.

IV Factual Data, A (cont.)

The digital comparator will take this information and compare it with the information from the programmer. The results are then processed to the visual readout and printer, and the "go/no-go" circuit. For the lower frequencies there is no mixing, thus information can be applied directly to the counter.

To measure VHF, the incoming test frequency can be mixed with a beat frequency oscillator (bfo), which has a difference frequency of 10 kc. To maintain an accuracy of measurement within specifications (0.005-1%), the bfo can be a crystal- or tuning-fork-controlled oscillator, the tolerance of which can be maintained at 0.002%. The difference frequency (10 kc) can then be measured by a pulse counter, the 3-decade output of which will have a minimum accuracy of 1%. Since 1% of 10 kc is 100 cycles, and this error reflected back to carrier frequency would be 0.00005% at 200 mc, at 10 kc the error reflected back would be 1%. The stated error would then be the 0.002% error of the oscillator, plus the reflected error of 1%, or a total of 1.002%. Below this frequency, direct-frequency measurement can be made with a minimum readout accuracy of direct-frequency measurement can be made with a minimum readout accuracy of 0.1% and a maximum error of 1%.

(3) Audio-Frequency Signal Generator

Certain discrete audio frequencies are needed for audio response tests, modulation-percentage tests, and frequency-deviation tests. An audio oscillator continuously covering the entire range from 20 to 20,000 cycles is not required for field testing. Spot audio frequencies may be chosen which will perform the required checks. Following are the suggested frequencies, in cycles, based upon those required under this study contract: 250, 500, 1000, 2500, 5000, and 15,000.

One audio-frequency oscillator module, constructed of stable solid-state oscillators, may be packaged in a small convenient size. The various frequencies can be programmable, as well as the required voltages. This oscillator will supply signals directly to the equipment under test, or will modulate the R-F signal generator.

IV Factual Data, A (cont.)

A survey has been made of commercially-available, unit-packaged circuits which can be applied to each major plug-in building block. For example, some typical units are listed below:

- (a) Transistorized crystal oscillator 1 x 1 x 1-1/8 in.
 - (b) Power supply unit (one per five oscillations) 2 x 2 x 3 in.
 - (c) Tuning fork oscillator 1-1/2 x 1/2 x 3 in.
 - (d) Crystal discriminator 15/16 x 3/4 x 1 in.
- (4) Oscilloscope

Analog methods of display are not required for automatic or semi-automatic testing, because of the digital print-out or similar voltage recording. The automatic testing will require a lower operator skill level, in general, than would be required in the use of an oscilloscope. Modular-designed oscilloscopes present no design problems; the basic principles are well established.

(5) Output Meter

This is a low-power measurement device at audio frequencies. It is designed to rectify, at audio frequencies, and condition the receiver output signal to a voltage which is a linear representation of the input decibels referred to a standard power level. The design will closely follow the same lines as the voltage measurement modules. The input to the amplifier should take a dynamic range of from -60 to +40 dbm.

(6) Radio-Frequency Wattmeter

Radio-frequency power measurements from milliwatts to kilowatts may be measured with suitable attenuators. Calorimetric power meters adapted to a modular design contain a self-balancing bridge. The unbalance signal is amplified and applied to a comparison load resistor. The power supplied to the comparison load to rebalance the bridge is conditioned to an analog voltage which may be digitalized and compared to the limits.

IV Factual Data, A (cont.)

An additional method worth investigation, because of simplicity and reliability, is to couple the R-F power output of the unit under test to a lamp. The illumination of the lamp will be detected by a photodiode and amplified. The d-c output of the amplifier will indicate the amount of power. This information will be digitized as required.

(7) Panoramic Indicator

Panoramic indicators are widely used in the testing of frequency-modulated transmitters. An important part of the test procedure is the measurement of frequency deviation as a function of the modulation. The use of an oscilloscope in field testing, as a method of deviation measurement, would be discontinued with the use of building block test modules.

Panoramic indicators use automatic scanning and super-heterodyne-type circuits for the simultaneous visual analysis of both the frequency and amplitude of R-F signals. Such test instruments must use a calibrated external oscillator.

In the modular form, frequency-deviation measurements would never be displayed on an oscilloscope. If it is desired to measure the frequency deviation of some F-M transmitter, the transmitter antenna, through suitable attenuation, is mixed with the output of a R-F oscillator module of the correct frequency to produce a difference deviation frequency, assuming modulation has been applied. The IF thus generated is then fed to a crystal discriminator; next, the maximum output is measured by the analog to digital (A-D) converter. The output of the A-D converter is then presented to the comparator for limit checking, as well as to the readout circuitry.

(8) Distortion Measurement

At audio frequencies the percentage of distortion may be measured in a variety of ways. One method is suitable for automatic testing. The test frequency is applied to the equipment, and the output is phase inverted. The original test frequency and the inverted output are mixed. The resultant voltage contains only the harmonic elements.

IV Factual Data, A (cont.)

The resulting harmonic frequencies will be processed through a true rms meter circuit which will produce a d-c output that is dependent on the rms of the input voltage. This information will be converted to digital form and compared with the limits from the programmer for the "go/no-go" circuit. The ability to measure distortion amounts of 5 and 10% is required.

(9) Spectrum Analyzers

Radio-frequency spectrum analyzers required in microwave applications in the kilomegacycle ranges are used chiefly to examine power in pulsed or continuous-wave radar and beacon signals. Such analyzers are designed for specific frequency bands. As an example, the AN/UPM-58 has the following characteristics.

Frequency coverage	16,000 \pm 200 mc
Measurable input pulse modulation	0.2 to 2 microseconds
Measurable repetition rate	100 to 10,000 pulses/second

Although the design of such a specialized piece of test equipment would be possible in modular form, it is felt that the complexity of such a module, as well as its relative lack of use, would offset any advantages gained.

(10) Pulse Generators and Pulse Counters

Pulse generators as input stimuli equipment may be readily constructed of solid-state devices and packaged in building block form. Discrete pulse frequencies and pulse widths may be assigned and programmed as required for specialized test procedures.

Pulse counters can be designed from standard solid-state counter circuitry, and the information in digital form may be displayed or compared. The transfer of pulse heights into digital form may be accomplished by a gate which will pass pulse trains representative of the pulse height.

IV Factual Data, A (cont.)

(11) Sweep Generators

Sweep generators will be substituted in an automatic checkout system by sampling circuits which will measure waveforms at critical points. The waveforms as analog voltages may be handled in the same manner as other a-c voltages.

(12) Logistics and Support

The establishment of design standards and specifications for sizes will assure minimum-cost production and ease of replacement of individual modules and building blocks; standardization is the important aspect. The ultimate goal is to replace several hundred pieces of test equipment with a few dozen building blocks. Simplicity of the individual units will eventually bring the cost sufficiently low that it may become practical for the field army to discard, rather than attempt to repair, individual modules. However, reliability of individual blocks will be enhanced by careful design, simplicity, and encapsulation.

Self-checking will be an integral part of the test equipment. Every effort should be made to create a high degree of operator confidence. Additional considerations relating to automatic testing will be discussed in the appropriate sections.

3. Semiautomatic and Automatic Testing

a. Advantages of Automated Testing

There are many benefits to be gained in adopting automated test methods. The following five reasons illustrate some of the advantages.

- (1) Lower skill level or less training will be required for operating personnel.
- (2) Test results are more accurate.
- (3) The testing time will be reduced.

IV Factual Data, A (cont.)

(4) Logistic advantages will be realized, due to the handling ease of the more compact test equipment and the reduced testing time.

(5) Repeatability of test results will be greater.

Concerning Item (5) above, many groups of tests must be performed in the same manner every time. Automatic testing will eliminate operator deviations, since procedures have often varied from operator to operator. A test might be skipped, should one operator question its necessity or validity.

Additional advantages of automatic testing are apparent; for example, a printout of the test becomes a permanent record of the results.

In analyzing the need for automatic testing, consideration must be given to the complexity of the equipment to be tested, as well as to how many pieces of equipment may be expected to require test and repair. It is axiomatic that the automatic test equipment must require less upkeep and repair than the equipment to be tested. Complexity of the tactical electronic equipment will directly affect the size and complexity of any automatic testing equipment.

Further consideration must be given to the availability of test points in current Army electronic equipment. Future design of electronic equipment should reflect the trend toward automatic testing by the inclusion of sufficient test sockets.

b. Rating

Any analysis concerned with the practicality and feasibility of semiautomatic or automatic testing must be concerned with the number of pieces of equipment to be tested and the complexity of these pieces of equipment. For this reason, considerable time was spent in setting up a "yardstick" in an effort to evaluate the two above factors and assign a priority to any considerations of automatic testing. Any such set of rules will have exceptions, and such exceptions will be noted as they appear.

IV Factual Data, A (cont.)

The Divisional Table of Operations and Equipment (TOE) was the source for the divisional number of pieces of equipment of each type. The pieces of equipment most numerous in one of the three divisional types was the number selected to be the population factor (P.F.). In other words, the totals in the Infantry, Airborne, and Armored Divisions were all checked. The highest authorized total appearing in any one of the three was the selected population factor number. This number was then divided by 1000.

The Aerojet study and tabulation of alignment and final testing was the source for the complexity factor (C.F.). The complexity factor was the tabulated sum of alignment and final tests. This whole number was then divided by 100 to arrive at a decimal quantity. Since the P.F. number was divided by 1000 and the C.F. number was divided by 100, this then gave relative weights to the two fractions.

Table 1 presents the results of subjecting 35 varied pieces of tactical electronic equipment to the rating system. Such a study indicates that, of the 35 pieces, the TA-312/PT telephone set is best suited for semiautomatic testing from the viewpoint of quantity within the division. However, from a complexity viewpoint, the electronic circuitry is quite simple. Adjustments of the TA-312/PT will tend to be more of a mechanical nature, requiring the replacement of such items as handset cords, batteries, or transmitter elements. Most of the testing, therefore, does not lend itself to automation.

The second and third items of Table 1, the AN/PRC-10 and the RT-196/PRC-6 (AN/PRC-6), are ideal, both from a quantity and a complexity factor. Of these, the RT-196/PRC-6 was selected for a rigorous examination.

Radio Set AN/PRC-6 (RT-196/PRC-6) is a miniature, low-power, battery-operated radio receiver and transmitter used for voice communication over short distances. It is intended for use when a compact, easily operated radio set is required. The technical characteristics are as follows:

Frequency range	47 to 55.4 mc
Number of channels	43

IV Factual Data, A (cont.)

Channel width	100 kc
Channel separation	200 kc
Tuning method	Preset to single channel
Type of modulation	FM
Distance range (approx.)	1 mile
Power output	0.25 watt
Number of tubes	13
Intermediate Frequency	4.3 mc

c. System Concepts

Figure 1 is the generalized block diagram of an automatic or semiautomatic test configuration constructed of building blocks.

(1) Building Block Categories

These modular building blocks fall into three distinct categories.

- (a) The interface (with electronic equipment), power and control group
- (b) The programmer, comparator, and printer group
- (c) The stimuli generator and response measurement group.

Interface is interpreted to mean the adaptive circuitry and connections necessary for the transmittal of required stimuli and the reception of required response from the selected electronic equipment.

(2) Interface Category

The following items are in this category:

- (a) Necessary test probes
- (b) Required test socket connectors
- (c) Special components for signal matching and attenuation
- (d) Provision for the interconnection of the above items with one another and with the test instrumentation.

IV Factual Data, A (cont.)

The amount of interface adaptation required, and the complexity of such adaptation, is inversely proportional to the corresponding amount of test circuitry engineered into the design of the communication equipment. If all required test voltages are brought out to accessible test receptacles, interface problems with automatic test equipment are kept to a minimum.

Current types of tactical electronic equipment vary widely in the location and number of test points. Future standardization in this area should be one design goal. Many maintenance checks on field equipment require elaborate and time-consuming test-equipment setups, with the test itself requiring very little time.

The interface adaptor should be a separate interchangeable module in the building block program.

Methods of control fall within this same category, since some way of switching test signals to and from the communication equipment must be provided. This control equipment will be energized by a programmer, and will be either mechanical or electrical switching (e.g., relays, diodes, or transistors).

Some method of programming the test sequence must be incorporated. Of the many methods available, such as Core, Tape, or Punch Cards, the most compact and trouble-free from a field-maintenance standpoint is the punched-tape block reader with Mylar tape. Such a tape reader may use tape containing many groups of tests. The tape may be updated, revised, and corrected rapidly by the substitution of new tapes made up in depot areas, or by splicing in the field area. Block readers are compact in design, may be made virtually foolproof, and lend themselves to modular construction. Such readers, once the test sequence is established, will advance automatically from test to test unless there are indications of trouble.

(3) Tape Programmer Functions

The tape programmer will perform these functions in an automatic test sequence:

IV Factual Data, A (cont.)

- (a) Apply necessary stimuli to the equipment under test
- (b) Connect necessary response conditioning equipment to the equipment under test
- (c) Supply the "go/no-go" comparator with the test limits
- (d) Define the sequence of the tests
- (e) Identify the test setup.

The first block in a test sequence may be designed to check the modules in both type and position as required for the sequence.

The programmer, comparator, and printer group may be self-contained or, as had been mentioned earlier, may be taken over by the FIELDATA Equipment. Further study in this area is needed in order to define the conversion requirements.

Visual display and printout of test results are required. The operator requires visual display as a means of immediate performance evaluation, but printout of results is necessary as a form of permanent record. This permanent record could accompany each piece of equipment passed for return to service.

The use of a data printer in portable equipment is completely feasible because at least one subminiaturized data printer is available which is capable of printing 12 columns of parallel-entry data at a rate of two rows (two tests) per second. This particular unit measures 6-1/4 x 4-1/4 in. and requires an installation depth of 6-1/2 in.

d. Control

All modules should be programed either internally or by a combination of internal and external control and switching.

Specific switching functions are performed by the control switching building blocks. Each building block consists of a differentiator circuit, a flip/flop circuit, and a solid-state switch. The switch closes upon

IV Factual Data, A (cont.)

receipt of a control-line level change, and opens upon receipt of a reset-line level change. The activation of the control and reset lines are dependent upon the program commands received from the programmer/comparator/decoder unit.

Solid-state or diode switching should be utilized whenever possible. Certain cases of very low frequencies or ultra-high frequencies will certainly require mechanical relays. However, even mechanical relays have been miniaturized to permit compact design.

4. Application of Modules to Testing Specific Equipment

a. Test Diagrams

Several months ago it became obvious that a method for diagramming the tests in a clear, simple manner was needed. Figure 8 illustrates the resultant form of the diagrams, which permit a display of separate tests. In this manner, the modules required can be critically evaluated as to the possibilities for automation.

The next step was to rewrite a technical manual to comply with automatic test procedures. Many equipments were diagrammed, and several were selected for revision of the final testing procedures to reflect an automatic test sequence.

The AN/PRC-6 was selected for extensive examination, since it could illustrate the required tests without extreme complexity. Figure 9 is a block diagram of the test configuration for the AN/PRC-6. From the diagrams, an automatic final test procedure evolved requiring the elements shown in Figure 10. Chapter 6, "Final Testing," in TM 11-4069 (the maintenance for the AN/PRC-6) was rewritten. The original sections, immediately followed by suggested rewritten sections, for a technical manual prepared for automatic testing are shown below.

b. Automatic Final Testing - AN/PRC-6

Original:

62. Test Equipment

IV Factual Data, A (cont.)

- (1) Electronic multimeter TS-505/U
- (2) Signal generator AN/URM-25
- (3) Signal generator AN/URM-48
- (4) Audio oscillator TS-382A/U
- (5) Frequency meter TS-174B/U
- (6) Panoramic indicator IP-173/U
- (7) Electronic multimeter ME-6A/U
- (8) Battery BA-270/U
- (9) Resistor, 49 ohms, 1/2 watt (noninductive)
- (10) Resistor, 600 ohms, 1 watt
- (11) Battery, 9 volts
- (12) Potentiometer, 1000 ohms (carbon disk)
- (13) Resistor, 450 ohms, 1/4 watt
- (14) Resistor, 15 ohms, 1/4 watt.

Automatic:

Test Modules

- (1) Voltage conditioner (input 0 to 10 volts)
- (2) Radio frequency oscillators (51.0 and 4.3 mc)
- (3) Audio frequency oscillators (1000 cycles, 12 kc and 30 kc)
- (4) Mixer, filter.

Original:

63. Test Conditions

- (1) VOLUME control in maximum clockwise position
- (2) EXT-OFF-INT switch in EXT position
- (3) Resistor, 600-ohm, connected between Terminal 5 of E2 and ground
- (4) Electronic multimeter TS-505/U connected across the 600-ohm resistor

IV Factual Data, A (cont.)

- (5) Power supply
 - Filament, +1.5 volts
 - Bias, -4.5 volts
 - Plate +45 and +90 volts.

Automatic:

Test Conditions

- (1) VOLUME control in maximum clockwise position (operator function)
- (2) EXT-OFF-INT switch in EXT position (operator function).
- (3) All special attenuation and matching will be a part of an interface adapter.
- (4) Power supply may be the self-contained batteries or may be supplied by the test set.

Original:

64. Receiver Sensitivity Test

- (1) Connect signal generator AN/URM-48 through a 49-ohm resistor to J3.
- (2) Adjust the signal generator output to 1 millivolt at the receiver frequency.
- (3) Modulate the carrier with a 1000-cycle signal at a deviation of 15 kc, and measure the audio voltage across the 600-ohm resistor.
- (4) Turn the modulation off and measure the noise voltage across the 600-ohm resistor.
- (5) The ratio of voltages should be not less than 3 to 1.

Automatic:

Receiver Sensitivity Test

- (1) After programer is advanced to first test position, initiate tests.

IV Factual Data, A (cont.)

- (2) Programed R-F oscillator module output is applied to J3 at correct level.
- (3) Programed A-F oscillator module output (1000 cycles and 15 kc) is switched to modulate the R-F oscillator.
- (4) Audio output of receiver is applied to voltage conditioner. This voltage is digitized and temporarily stored.
- (5) Modulation removed by programer. Noise voltage and stored voltage, in (4) above, compared. The minimal 3:1 ratio is automatically determined and a "go" or "no-go" condition is indicated.
- (6) Automatic advancement to next test.

Original:

65. Selectivity Test

- (1) Remove V2 and connect signal generator AN/URM-25 to Pin 1 of the socket through a 0.01- μ f capacitor.
- (2) Adjust the signal generator to operate at 4.3 mc, unmodulated. Adjust the output for a reading of -1-volt dc between Test Point 3 and ground.
- (3) Double the output of the signal generator, vary its frequency to the low side and then to the high side of 4.3 mc. Record the frequency reading at which the voltage at Test Point 3 is -1 volt. These two readings are called the "two times down readings."
- (4) Repeat Step (3) above with 1,000 times the original input signal. These two readings are called the "1,000 times down readings."
- (5) The bandwidth should be as follows:

<u>Times down</u>	<u>Total bandwidth (kc) (difference in readings)</u>
2	70 to 90
1	750 maximum

IV Factual Data, A (cont.)

Automatic:

Selectivity Test

- (1) Previous operator function on initial test setup has been to make connections to the tube socket V2 by means of a plug-in adapter. This adapter and the 0.01- μ f capacitor are additional portions of the overall modular interface adapter.
- (2) Programed 43. mc, unmodulated, is applied to Pin 1. The 43.-mc center frequency is automatically varied a specified amount below and above, and the resultant voltages at Test Point 3 are compared to limits.
- (3) Step (2) above is repeated with the wider frequency variation.
- (4) Automatic advancement with "go" condition.

Original:

66. Discriminator Characteristics

- (1) With no signal applied and filament switch S1 open (pulled up), measure the voltage at Test Point 4. This reading is called the bias.
- (2) Remove V2 and connect signal generator AN/URM-25 through a 0.01- μ f capacitor to Pin 1 of the socket.
- (3) Set the signal generator to operate at 4.3 mc, unmodulated. Depress S1 and adjust the signal generator output for full limiting (-6 to -7 volts at Test Point 3).
- (4) The voltage reading at Test Point 4 should be the bias ± 0.3 volt.
- (5) Adjust the signal generator to 4.325 mc and then to 4.275 mc. Record the voltages at Test Point 4.
- (6) At 4.325 mc, the reading should be the bias plus 6 volts; at 4.275 mc, the reading should be the bias minus 6 volts, the difference between the values should be less than 1 volt.

IV Factual Data, A (cont.)

Automatic:

Discriminator Characteristics

- (1) Bias reading at Test Point 4 is applied to voltage conditioner.
- (2) Refer to step (1) above in Selectivity Test.
- (3) The 4.3-mc output is increased a specific amount.
- (4) Test Point 4 voltage reading is compared to limits.
- (5) The 4.3-mc oscillator is varied to 4.325 and 4.275 mc. The voltages are compared to limits.

Original:

67. Transmitter Power Output

- (1) Connect the dummy load, consisting of a 49-ohm noninductive resistor, between antenna connector J3 and ground. Make the dummy load leads as short as possible.
- (2) Connect the VTVM across the dummy load.
- (3) Set the EXT-OFF-INT, switch to the INT position and depress the push-to-talk microswitch.
- (4) Operate the transmitter at 47.0, 51.2 and 55.4 mc. Measure the R-F output voltage across the dummy load at each of these frequencies. The output should be not less than 3.5 volts ac.

Automatic:

Transmitter Power Output

- (1) The dummy load is part of the interface adapter.
- (2) The voltage conditioner is connected across the dummy load.

IV Factual Data, A (cont.)

- (3) EXT-OFF-INT, switch and PUSH-TO-TALK switch are operator functions.
- (4) R-F voltage is conditioned and compared to limits.
- (5) Advance to next test on "go" indication.

Original:

68. Transmitter Static Deviation Test

- (1) Disable the AFC circuit by removing limiter tube V7 and disconnecting the bias at Terminal 7 of E1.
- (2) Connect the 1,000-ohm potentiometer across the 9-volt battery, with the center contact of the potentiometer connected to Pin 4 of Test Socket J2, and the positive terminal of the battery to ground.
- (3) Adjust the potentiometer for zero volts bias. Set the transmitter frequency to 51.0 mc. Press the PUSH-TO-TALK switch and check the transmitter frequency with frequency meter TS-174B/U.
- (4) Adjust the potentiometer so that -9.0 volts is applied to Pin 4 of the test socket.
- (5) The frequency meter should read 51.4 mc.

Automatic:

Transmitter Static-Deviation Test

- (1) These functions of V7 removal and disconnection at terminal 7 of E1 will be accomplished automatically by adapters.
- (2) All connections described in Step 2 of the original will be made in the interface adapter.
- (3) PUSH-TO-TALK switch operation is an operator function. Transmitter frequency will be compared to a standard crystal-controlled oscillator and the amount of deviation will be counted.

IV Factual Data, A (cont.)

- (4) Automatic voltage adjustment. The change in frequency will be measured and compared.
- (5) Automatic advancement to next test on "go" indication.

Original:

69. Transmitter Dynamic Frequency Deviation Test
(Using Panoramic Indicator)

- (1) Make a voltage divider; use a 450-ohm and a 15-ohm resistor connected in series. Place the voltage divider across the output terminals of audio oscillator TS-382A/U. The 15-ohm resistor should be on the low side.
- (2) Connect the audio output from across the 15-ohm resistor to Terminals 1 and 6 of terminal strip E1 in the radio set.
- (3) Connect panoramic indicator IP-172/U to read the frequency deviation of the radio set.
- (4) Connect signal generator AN/URM-48 to the panoramic indicator so that it will provide the heterodyne signal.
- (5) Set the audio oscillator to provide an output of 1,000 cycles per second at 1 volt.
- (6) Turn the radio set on and press the PUSH-TO-TALK microswitch.
- (7) The deviation should be between 12 and 30 kc.

Automatic:

Transmitter Dynamic Frequency Deviation Test

- (1) The voltage divider, as described in Step (1) above of the original procedure, will be part of the interface adapter.

IV Factual Data, A (cont.)

- (2) Connection to Terminals 1 and 6 of terminal strip E1 will be made on the initial setup.
- (3) An internal (to the automatic tester) oscillator will beat with the transmitter frequency. The audio oscillator will be mixed with the R-F oscillator.
- (4) The press-to-talk switch will be an operator function.
- (5) The deviation will be measured by a crystal filter and a frequency-to-dc converter. The representative voltage limits of 12 and 30 kc will be compared.
- (6) Completion of test series.

5. Major Items in Printouts

There were 60 items of prime electronic equipment reviewed and tabulated in the comprehensive survey first summarized.

Each item was tabulated on a separate sheet, and the resulting IBM cards were indexed by the item number. The coding and the column entries were identified according to the following system.

Sections under which information is tabulated are:

Code 100-199 - Power Requirements

Primary external power required (voltages, currents). If external power supplies are used, list voltage outputs and types of voltages with current requirements.

Code 200-299 - Trouble Shooting

List test equipment and special accessories required. List maximum and minimum resistances and voltages, other than zero and infinity, as normally indicated on trouble-shooting charts. (Example: Tube Base Readings)

IV Factual Data, A (cont.)

Code 300-399 - Alignment

List test equipment and special accessories. List discrete values or limits of test equipment readings and/or levels of function generators, along with tolerances (percentage of) for each alignment or adjustment operation. Omit operations of a mechanical nature.

Code 400-499 - Final Test

List as in Code 300-399, above.

Column Headings and appropriate entries are as follows:

Item - An identity number is assigned each component and is entered under this column.

Sequence - A number must be assigned each line of data. This number is to be in sequence and in the category previously stated.

Test Equipment Nomenclature - The identity number of the test equipment as given in the manual is entered in this column; also, identity numbers of accessories when given.

Function Description - Enter in this column the particular function occurring at the time of the specific test.

Function Code - When this is required, use code as given in Table 2.

Primary Values - Low or discrete and high.

Value - Lowest value or only value to occur during that portion of the test.

Unit - Abbreviated unit of measurement.

High value and unit.

Tolerance, percentage of - where limits are given, enter the limit in form of equivalent percentage.

Secondary Values and Remarks - Enter any additional information necessary or useful to the operation.

IV Factual Data, A (cont.)

Various codes were utilized to assist in condensing the information for collation. Tables 2 and 3 show the codes as explained in the above procedures. A function code of "213" would indicate that the particular value was an "Output Voltage at Audio Frequency." Codes for the values of voltages, currents, frequencies, powers, resistances etc., are standard abbreviations wherever possible. A substitution of u for the letter μ , to indicate "micro", was made for practical key-punch reasons.

As the tabulated sheets were finished, as shown in Figure 11, they were checked and given to key-punch operators. The following IBM equipment was used to assist in the data reduction and in the preparation of the final report: key-punch, verifier, reproducing punch, alphabetic interpreter, alphabetic collator, sorter, and an electric accounting machine (EAM).

The EAM was used extensively to print-out the data. A special wiring panel was made for the data printout. Figure 12 is an example of data printout sheets.

Several types of tabulations were undertaken; the following types were completed: (1) equipment description with emphasis on trouble shooting, alignment, and final test; (2) current types of test equipment, with ranges, (3) vacuum tubes and diodes used in the representative equipment.

Several thousand IBM cards were required to contain the information and many combinations of cards were collated and printed out. Examination of the distributions of frequency, voltage, resistance, power, and current were made. The results of the final data reductions formed part of the basis for specific conclusions.

The 60 items of prime equipment tabulated and key-punched on standard IBM cards and the appropriate technical manuals are listed below. The detailed printout of the data tabulated is to be in the Summary, Appendix A.

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IV Factual Data, A (cont.)

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
AN/TRC-24	Radio Set	TM 11-697
T-642/GRN	Radio Beacon Transmitter	TM 11-5825-202-35
AN/GRA-6	Control Group	TM 11-5038
CV-2/TX	Converter	TM 11-4021
TA-182/U	Signal Converter	TM 11-2137
AN/PRS-3	Detector Set	TM 11-4074
R-395/PRD-1	Radio Receiver, Direction Finder	TM 11-677
AN/TRD-10	Direction Finder Set	TM 11-298
TT-1/TXC-1	Facsimile Transceiver	TM 11-2258
AN/UIC-1	Intercommunication Set	TM 11-2643
AM-65/GRC	Audio-Frequency Amplifier	TM 11-5039
AN/VIA-4	Intercom Station	TM 11-706
TH-5/TG	Telegraph Terminal	TM 11-2239
PP-109/GR	Power Supply	TM 11-5036
PP-281/GRC	Power Supply	TM 11-5040
AN/FPN-33	Radar Set	TM 11-1538
AN/MPQ-4A	Radar Set	TM 11-5840-208-30
AN/TPS-25	Radar Set	TM 11-5840-217-35
IM-156/PD	Radiacmeter	TM 11-6665-207-35
IM-631/PDR-27A	Radiacmeter	TM 11-5543
IM-93/UD	Radiacmeter	TM SIG 226-7
R-108/GRC	Radio Receiver	TM 11-0898
R-109/GRC	Radio Receiver	TM 11-0898
R-110/GRC	Radio Receiver	TM 11-0898
RT-178/ARC-27	Receiver-Transmitter	TM 11-5821-225-24
T-195/GRC-19	Radio Transmitter	TM 11-0806
AN/GRR-5	Radio Receiving Set	TM 11-295
RT-196/PRC-6	Radio Set	TM 11-4069
AN/PRC-8	Radio Set	TM 11-4065
AN/PRC-9	Radio Set	TM 11-4065

IV Factual Data, A (cont.)

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
AN/PRC-10	Radio Set	TM 11-4065
AN/PRC-10A	Radio Set	TM 11-4065A
AN/URC-4	Radio Set	TM 11-510
TT-76/GGC	Teletypewriter Set	TM 11-2225
RT-77/GRC-9	Receiver-Transmitter	TM 11-263
AN/GRC-46	Radio Teletypewriter Set	TM 11-5815-204-35
J-668/GR	Interconnecting Box	TM 11-5815-204-35
AN/GRC-30	Radio Set	TM 11-614
AN/TMQ-5	Radiosonde Recorder	TM 11-2436
AN/GMD-1A	Rawin Set	TM 11-271A
RT-66/GRC	Receiver Transmitter	TM 11-289
RT-67/GRC	Receiver Transmitter	TM 11-289
RT-70/GRC	Receiver Transmitter	TM 11-290
AN/GSA-7	Radio Set Control	TM 11-5135-15
RC-289	Remote Control Set	TM 11-2667
AN/TCC-11	Telephone Repeater	TM 11-2148
AN/TNS-3	Sound Ranging	TM 11-2552A
SB-22/PT	Manual Switchboard	TM 11-2202
SB-86/P	Telephone Switchboard	TM 11-4134
TA-1/PT	Telephone	TM 11-5905-243-35
TA-312/PT	Telephone Set	TM 11-2155
AN/PGC-1	Teletypewriter Set	TM 11-5815-206-35
AN/TCC-7	Telephone Terminal	TM 11-2139
RT-494/APX-44	Radar RCVR-XMTR	TM 11-5895-217-35
R-445/ARN-30	Radio Receiver	TM 11-5826-207-24
CV-265/ARN30A	Signal Data Converter	TM 11-5826-207-204
AN/ARN-59	Direction Finder Set	TM 11-5826-204-35
AN/ARC-44	Radio Set	TM 11-517
R-746/AR	Radio Receiver	TM 11-5826-200-35
ARC Type 12	Radio Set	TM 11-525-25

IV Factual Data, A (cont.)

In addition to the prime equipment, the following 31 items of test equipment were tabulated in detail and key-punched on the standard IBM cards. The detailed print-out will be found in the Summary, Appendix A.

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
TS-723/U	Spectrum Analyzer	TM 11-5097
IP-173/U	Panoramic Indicator	TM 11-5086
TS-174B/U	Frequency Meter	TM 11-5044
FR-67/U	Frequency Meter	TM 11-2698
SCR-211	Frequency Meter	TM 11-300
AN/URM-80	Frequency Meter	TM 11-5095
AN/URM-32	Frequency Meter	TM 11-5120
AN/URM-79	Frequency Meter	TM 11-2094
SG-15/PCM	Signal Generator	TM 11-2096
608-C(AN/USM-44)	Signal Generator	TM 9-4940-401-34/7
I-208	Signal Generator	TM 11-317
AN/URM-25	Signal Generator	TM 11-5551
TS-497/URR	Signal Generator	TM 11-5030A
AN/URM-48	Signal Generator	TM 11-1257
SG-71/FCC	Signal Generator	TM 11-5088
TS-382/U	Signal Generator	TM 11-2684A
TS-253/U	Multimeter	TM 11-5527
TS-183/U	Voltmeter	TM 11-2571
ME-6B/U	Electronic Multimeter	TM 11-5549A
ME-30/U	Voltmeter	TM 11-5132
TS-585/U	Output Meter	TM 11-5017
TS-297/U	Multimeter	TM 11-5500
AN/PRM-15	Multimeter	TM 11-5090
TS-505/U	Electronic Multimeter	TM 11-5511A
ME-11/U	Wattmeter	TM 11-5133
OS-8/U	Oscilloscope	TM 11-1214

IV Factual Data, A (cont.)

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
AN/USM-50	Oscilloscope	TM 11-5129
AN/UPM-15	Pulse Generator	TM 11-6625-368-10
I-177B	Tube Tester	TM 11-2627
TV-7/U	Tube Tester	TM 11-5083
TV-2/U	Tube Tester	TM 11-2661

The tabulated data for the preceding pieces of equipment selected for study were analyzed, and printed out on summary sheets. These sheets containing the following information were prepared from applicable IBM cards:

- a. Equipment nomenclature and description
- b. Maintenance manual required (TM number)
- c. Frequency range and type of emission or reception
- d. Power requirements
- e. Internal voltage and resistance ranges
- f. Various internal frequencies (intermediate, etc.)
- g. Output power levels
- h. Required test equipment as listed in the technical manuals.

An important part of the tabulation was the listing of the accuracies required in the various readings. From these accuracies, listed in percentages, it is possible to summarize the results, and from this to deduce the required accuracy of a specific measurement module. Following is a summary of accuracy tabulations:

<u>Type of Measurement</u>	<u>Accuracy, %</u>
Voltage	3 to 20
Frequency	0.005 to 1
Resistance	10 to 20
Transmitter output power (RF)	10 to 20
Receiver output power (AF)	5 to 20
Primary power	10

IV Factual Data, A (cont.)

Measurement accuracy of discrete channel frequencies, oscillator frequencies, or intermediate frequencies is high. However, test frequencies specified in determining power output on various bands may be varied 20% without affecting the test. The end use of the test frequency must be determined before the required accuracy can be stipulated. The discussion on frequency groupings (see Paragraph IV,A,5) presents those frequencies which may be combined where required accuracy permits.

As a part of the overall study, vacuum tubes and diodes which are used in the selected pieces of equipment were tabulated along with their use in the equipment. This tabulation was further condensed, and 170 types of vacuum tubes and diodes were summarized. The total usage of each type was also listed. It is noteworthy that eight tube types represent 30% of the total number of tubes used in the equipment studied. A total of 1164 tubes and semiconductor diodes were tabulated. Of this total, 390 were accounted for by the following tube types:

12AT7	6AL5
6AK5	12AU7
6AU6	5670
5814	5687

6. Secondary Items in Print-Out

The value of storing the test data on IBM cards is readily apparent when the summary of any one parameter is desired for all the equipment to be tested. In this manner the frequency spectrum of the equipment tabulated, for example, was obtained for study.

The entire frequency spectrum was charted, both from a very general aspect and from the viewpoint of specific pieces of equipment. Figure 6 is a chart of the electromagnetic spectrum covered in the electronic equipment studies, with particular emphasis on discrete test frequencies. Figure 7 shows the spectrum for specific pieces of equipment.

IV Factual Data, A (cont.)

The log scale of Figure 6 covers the frequency spectrum from 10 cps to 10 kmc. An attempt was made, by selective shading, to indicate the frequencies utilized by both frequency-modulated equipment and amplitude-modulated equipment. The audio frequencies associated with these two types are also defined. Intermediate frequencies are separated from radio frequencies. The ranges required of frequency meters and a specific panoramic indicator are shown for comparison.

Figure 7 covers the spectrum from 100 cps to 100 kmc. Representative pieces of tactical electronic equipment, including test equipment, are listed in line with the frequencies covered. The receiver band coverage is indicated by solid lines. The intermediate frequencies are shown except in a few pieces of equipment, with variable IFs (intermediate frequencies). These variable IFs are shown as interrupted lines. Transmitter band coverage is indicated by an interrupted line. In the test equipment section, signal generators are indicated by solid lines and frequency meters are shown as interrupted lines.

One specific use of the data cards was to survey and collate the discrete frequencies in use. A list of frequencies and the number of times used in test procedures was prepared from the card summary. The results of this summary are presented in Figures 13 and 14. These figures illustrate how the collation of the mass of tabulated data was utilized. Appendix B contains the printout of all the data relating to specific frequencies. The collator was set up to remove all cards with the function code of 4 in the second-digit position. Examination of Table 2 reveals that this is the specific code for frequency or phase.

The entire group of cards thus culled were sorted numerically from the lowest frequency to the highest listed frequency, using the low or discrete values. At this time the frequencies were grouped, and from these groupings the bar charts shown in Figures 15 and 16 were generated.

As the study proceeded it became obvious that certain specific frequencies appeared much more often than others, and that certain groups of

IV Factual Data, A (cont.)

frequencies predominated. Many test frequencies were arbitrarily chosen from the various technical manuals. Without affecting the accuracy of the tests, these could be changed from many diverse nearby frequencies to one specific test frequency. This specific test frequency could be a part of a group composing one building block. The practical number of discrete frequencies in one module or block is a design consideration which may be defined as the study continues.

The study of various pieces of test equipment, and the ranges of this equipment, brought out the areas of redundancy. As examples, various multimeters and electronic multimeters all cover approximately the same range and perform approximately the same function. Some, of course, may be used more readily in forward areas since the only power requirements are internal batteries.

In a discussion of signal-generation and signal-measurement equipment, it may be pointed out that the building block concept will permit the interchangeable use of radio-frequency oscillators both as signal generators and as signal-measurement devices by applying the appropriate heterodyning techniques.

The bar graphs of Figures 15, 16, and 17 were prepared in order to show range overlapping in existing test equipment. Non-overlapping areas are also shown in order to present a total comparison of all existing equipment. Clarification should be given to items such as the SG-351/USD-1, the SG-336/U, and the BC-376 signal generators. The SG-351/USD-1 lower-frequency limit is 406 mc, while the upper limit is 420 mc. Clarification of the SG-351/USD-1 was considered necessary because the chart resolution in this frequency range is not adequate to define each megacycle. The SG-336/U is a sweep generator with center frequencies at 30 and 60 mc, and markers at 25, 35, 55, and 65 mc. The BC-376 is a single-frequency generator at 75 mc, and is used for performing certain receiver-antenna tests. The individual equipment range overlapping and the number of bands are not depicted in the graphs. Instead, the upper and lower limits are shown. Since ohmmeter ranges are essentially standard (except in specialized equipment), they were not included in the graphs. Output or power

IV Factual Data, A (cont.)

meter ranges in dbm were converted to watts in order to standardize the power meter graph scale.

7. Discussion in Review

The evaluation performed in this first phase of the program has indicated the advisability and the practicality of automatic testing within the framework of a modular, building block system. The examination of 91 items of Signal Corps communication and test equipment provided test data in support of this conclusion.

A decision to automate the maintenance testing is practically inevitable in an era of increasing mobility of ground forces, and increasing numbers of electronic equipment, particularly miniature versions operated by non-technical personnel. Some highly specialized electronic equipment will require more time in order to obtain completely automated testing procedures because of the extremely sophisticated automatic test equipment needed. At present, however, a major portion of even the most complex equipment may be automatically checked. Each item of electronic equipment considered for automatic testing should be evaluated on the following type of basis:

- a. The complexity of the item
- b. The number of these items in the Field Army
- c. The operator skill level required
- d. The need for speed in testing the item
- e. Improvement in supply.

B. SECOND PHASE

The Building Block Study program was logically divided into two parts as a result of the redirection. The second part, or phase, was to be concerned with the compilation of test requirements. The first phase, however, was a comprehensive survey of test requirements plus an analysis of the data and an application exercise. The breadboard, or application exercise, had not been performed at the time of the change in scope, and the analysis of data was curtailed. The preparation of preliminary design parameters, a natural outgrowth of the analysis, was accordingly halted.

IV Factual Data, B (cont.)

The second phase then became primarily a review of the Army technical manuals and related documents of prime electronic equipment, preliminary to a summary and an evaluation of the test data obtained. This information will furnish a basis for proceeding with building block system analysis and breadboard application in the future.

Most of the activity in this phase was concerned with securing technical manuals suitable for tabulation and processing. There was a great deal of material reviewed, but a large amount of it was not suitable for tabulation due to its non-technical content.

A shipment of technical manuals for review and tabulation was received early in March 1963 directly from the Commanding Officer, U.S.A. Electronic Research and Development Laboratory, Fort Monmouth, New Jersey. These manuals were ordered by Mr. A. Rosenblum, Chief of the Instrumentation Branch, USAERDL, specifically for use in this program, and are as follows:

Handbook for Radio Set AN/ARC-51.

Instruction Book for Radio Set AN/GRC-66 Vol. 2, Part III.

Instruction Book for Radio Set AN/GRC-66 Vol. 3, Part III.

Technical Instructions for Radio Set AN/GRC-50.

ARF Instrumentation and Measurements Techniques Study Report No. 14.

ARF Instrumentation and Measurements Techniques Study Report No. 15.

Instruction Book for Radio Set AN/VRC-12.

Service Test Instruction Manual for Multiplexer Sets AN/TCC-46, -47,
Book No. 5.

Service Test Instruction Manual for Multiplexer Sets AN/TCC-46, -47,
Book No. 6.

Technical Manual for the AN/GRC-106.

These manuals are essentially manufacturers' instruction books, and contain sufficient technical data for review and tabulation. They have been included in the material covered for this report, and their test parameters are listed in the IBM printout sheets (see Appendix C), with the exception of the

IV Factual Data, B (cont.)

two ARF Instrument and Measurements Techniques Manuals (which are not manuals of prime electronic equipment or test equipment). The printout of 18 other pieces of Army prime electronic equipment is also included in the same Appendix as part of the Phase Two tabulation.

1. Nature of the Data Desired

The data tabulation in this, the second phase of the program, has been simplified in line with the redirection of the program. In this version, the tabulations are made only of measurement ranges for prime electronic equipment and specified test equipment to perform the measurements. This means that the four divisions used previously for (1) power requirements, (2) trouble shooting, (3) alignment, and (4) final test are being replaced with the following codes and breakdown:

Code 100-199 Measurement Ranges

The measurement ranges are to be the minimum and maximum for each item measured.

Code 200-299 Test Equipment

All test equipment is that listed in the technical manual as required for maintenance testing of the prime equipment being evaluated.

The measurement ranges are tabulated according to the same code, Table 2, as used before. The ranges listed are the extremes for trouble-shooting, testing, and alignment.

The measurement data provides the range information needed for design criteria on the test modules and submodules. By planning the modules to test over the entire range of voltages, for example, with a single module, an economy in the total number of multimeters and electronic multimeters would be effected by substituting the more efficient module in their place. Similarly, the test instrumentation for power measurement (RF, dc or ac), current measurement, frequency measurement (including modulation, FM, AM, sideband, R-F carrier, etc.), resistance-impedance measurement, and any miscellaneous measurement, may be designed from the data tabulated under the measurement ranges.

IV Factual Data, B (cont.)

The listing of the test instruments required for maintenance of each item of Army electronic prime equipment is an essential part of the data survey. This information is important (1) in establishing the design characteristics of the building-block modules, (2) in furnishing comparative data on the number of pieces, (3) as a base for conventional-system price estimates, and (4) as a record of the testing capability of the conventional testing system. The compilation of this test instrumentation list will preclude any thorough preliminary design preparation for a building-block module testing system, and may be considered a necessary part of the data compilation. Accordingly, the data collection includes the test equipment in a summary beneath the test measurement ranges on the work sheets, and in the same IBM card packet for the particular equipment.

2. Discussion of Test Requirement Compilation

The technical manuals and handbooks have continued to be the test data information source, as they were in the earlier, phase one, part of this program. The securing of manuals covering testing at a fourth- or fifth-echelon level has become increasingly difficult, however, as mentioned in the monthly progress reports. The manuals written for lower level testing do not have the measurement range data needed for this study. They are set up to be "check procedures" on a "go no-go" basis instead. Many are for use with large built-in "test consoles." The supply of manuals of proper technical depth is good for electronic equipment maintenance as set up by the U.S. Army Signal Corps (now the USAELDR). These handbooks have been used successfully.

A large number of technical bulletins and manuals have been reviewed in the effort to present a complete tabulation of test requirements for Army prime electronic equipment. Most of the manuals reviewed in this latter part of the program proved to be inadequate. The Department of the Army Pamphlet DA No. 310-4 Index of Technical Manuals, Technical Bulletins, etc. was used to obtain the TM, TB, or TO numbers. These numbers were then used in ordering the documents. Many were ordered through the Aerojet-General Corporate Engineering

IV Factual Data, B (cont.)

Documentation Office, and others were borrowed from the Western Regional Office of the U.S. Army Signal Supply Agency in Pasadena, California, or reviewed directly in their library.

A great many of the Army Ordnance technical manuals were found to be classified Confidential and some Secret, especially those pertaining to radar equipment. As classified material lies outside the scope of this program, these manuals could not be used for test requirement review and tabulation. The newer equipment is in general more subject to security classification.

The USD-2 Surveillance System Airborne Drone program was reviewed at the Aerojet-General plant in Downey, California for possible use in this Building Block Study. The following unclassified service test manuals were obtained from the Publications Department of the Downey Plant:

STM-10-Operator and Organizational Maintenance Manual

STM-12-Operator's Manual

STM-13-Organizational Maintenance Manual.

These manuals contain basic information on the operation of the drone system, but the test data parameters are not sufficiently well defined for tabulation and transfer to the IBM cards. There is a good potential in the drone operation for testing with an integrated building-block module system. Later manuals should be adequate in the presentation test data requirement information. A large portion of the drone functions are classified, however, such as the radar equipment, the infrared instrumentation, and the integrated guidance and control equipment. If the test data for these equipments would be downgraded to Unclassified, the possibilities for a building block test system application would be very good.

The difficulty of securing the type of Army manuals needed led to the consideration of using Air Force technical manuals. Accordingly, at the suggestion of the USAELRDL office, Air Force documents equivalent to the Electronics Command Technical Manuals were ordered for study. About 100 manuals

IV Factual Data, B (cont.)

were requested from the U.S. Air Force at Rome, N.Y. and Dayton, Ohio, and subsequently received 30 to 60 days later. Some of them were reviewed and tabulated. However, under later instruction from Mr. A. Rosenblum, on his visit to Aerojet in February, work on the Air Force manuals was suspended in order that the limited time remaining could be devoted to the Army material, and the Air Force tabulations were omitted from this report.

There were 24 items of prime Army electronic equipment tabulated and recorded on IBM cards in this second phase (Phase B) of the program. The six items of equipment reviewed in manuals received from USAELRDL are included in this group. The 24 items are listed in order below:

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
AM/1805/FRC-55B	R-F Amplifier	TO31R2-2FRC-412
AN/AMQ-7	Humidity-Temperature Set	TO12M3-2AMQ7-2
AN/AMR-1A	Radiosonde Receptor	TO12M1-2AMR1-2
AN/AMT-6D	Radiosonde	TO12M4-2AMTG-11
AN/ARC-51	Radio Set	Naval Weapons Bureau
AN/FPN-33	Radar Set	TM 11-1538
AN/FRR40 and 41	Radio Receiving Set	TO31R2-2FRR40-6
AN/GPA-23	Radar, Computer-Tracking	TO31P1-2GPA23-2
AN/GRA-30	Transmitter Control Group	TO31R2-2GRA30-2
AN/GRC-50	Radio Set	Technical Instructions (USAELRDL)
AN/GRC-66	Radio Set	Instruction Book, Vol. II, III (USAELRDL)
AN/GRC-106	Radio Set	Technical Manual (General Dynamics Corp.)
AN/MRR-6	Receiving Set, Radio	TO31R2-2MRR6-2
AN/MRT-7	Transmitting Set, Radio	TO31R2-2MRT7-2
AN/PRS-4	Detecting Set, Mine	TM-9541
AN/TCC-46, -47	Multiplexer Sets	Raytheon Service Test Instruction Manual

IV Factual Data, B (cont.)

<u>Nomenclature</u>	<u>Description</u>	<u>Technical Manual</u>
AN/TRC-66	Radio Set	TO31R5-2TR66-2
AN/TRC-68(VRC-64)	Radio Set	TM11-5820-222-35
AN/ULT-T2	Trainer, Radar	TM11-6940-205-15
AN/VRC-12	Radio Set	Instruction Book (Avco Mfg. Corp.)
CU/547/GR	Antenna Coupler	TO31R1-2GR-142
IM-108/PD	Radiacmeter	TM11-6665-200-35
KWT-6	Transceiver	TO31R2-4-127-9
T-265/FRC-10	Radio Transmitter	TO31R2-2FRC10-26

3. Review of Major Items in Printout

The test parameters and the test instruments for the 24 items tabulated in this phase of the program are shown in Appendix C. The measurement ranges, coded according to the Key in Table 2 and the units in Table 1, are listed under each item of equipment, and are followed in each case, as before, by the list of test equipment prescribed in the manuals.

a. A survey of the voltage ranges and the frequency ranges to be found in these pieces of equipment was made and graphs drawn. Figure 18 illustrates in bar graph form the radio frequency ranges in each case. The audio frequency ranges, representative of a smaller portion of equipment, are drawn in the bar graph of Figure 19. The D-C voltage ranges are featured in Figure 20, and the A-C voltage ranges in Figure 21. The equipment number is marked on each measurement range. The range data from the graphs has been consolidated for convenience into the following summary of total range spread and discrete voltages and frequencies most commonly used.

Audio frequency, over-all range	50 cps - 100 kc
Discrete audio frequency most used	1000 cps
Widest audio range of any single equipment	50 cps - 100 kc

IV Actual Data, B (cont.)

Radio frequency, overall range	100 kc - 13.5 gc
Discrete radio frequency most used	400 mc
Widest r-f range of any single equipment	10 mc - 13.5 gc
Percent of total equipment in microwave range	25%
D-C voltage, over-all range	0.01 v, dc - 12 kv, dc
D-C voltage, range most used	2 v, dc - 125 v, dc
Widest d-c range of any single equipment	0.02 v, dc - 12 v, dc
A-C voltage, overall range	0.02 v, rms - 6.5 kv, rms
A-C voltage range most used	6.3 v, rms - 115 v, rms
Widest d-c range of any single equipment	1.4 v, rms - 6.5 kv, rms

The information on a-c or d-c current, d-c ohms, impedance, power, pulse, etc. has been consolidated into the following ranges. The population factor of usage for these measurements is low, and for this reason they have not been converted into graph form.

D-C resistance range	0.06 ohms - 150 megohms
D-C current range	10 μ a - 400 ma
A-C current range	0.5 - 6.0 amp
R-F power range	1.0 mw - 30 kw peak envelope 1 kw average
A-C power range	50 mw - 7.715 kw
Pulse width	1 μ s - 1.5 millisec
Pulse frequency	20 cps - 550 cps
Pulse power	140 watt (min. peak power)
Pulse amplitude range	1.3 v - 130 v P-P
Pulsating d-c range	16 - 60 v
Pulse voltage	1.4 kv discrete
Audio voltage	1 mv, rms - 2.5 v, rms 1.5 v - 42 v P-P
I-F frequency	297 kc - 457 kc

IV Factual Data, B (cont.)

A comparison between the equipment surveyed in this phase and that in phase one shows little change in the overall measurement ranges. There is, however, a modest shift upward in frequency. The newer equipment reflects use of higher frequencies with the 400-mc area predominant. Test equipment and test methods have been changing to meet higher-frequency requirements, especially for single-sideband-suppressed carrier equipment which has been coming into use recently. Communications microwave equipment, such as the AN/TRC-66 Radio Set, requires a substantial amount of microwave test equipment, as shown in the test equipment listed under the AN/TRC-66 printout in Appendix C.

The AN/TCC-46 and -47 tabulation is the first multiplexer system reviewed in this program. Its testing requirements are different because of the time division multiplex-pulse code modulation (TDM-PCM) pulse train operation.

Newer types of test equipment are more noticeable in the list of test instruments called out in Appendix C for the phase two prime equipment. Many items apparently had not been assigned AN numbers at the time the manuals were written, and are listed by the manufacturer's name and number.

A testing system requires flexibility to avoid an early obsolescence from the continuing changes in equipment. With the building block module system, the provision for modernizing of a specific module will be relatively simple, by substituting the redesigned sub-module or module replacement.

4. Test Data Extraction from the EAM Cards

The usefulness of the test data storage on the EAM cards is illustrated by the voltage measurement ranges listed in Appendix D. These voltages were rapidly sorted from the punch cards summarized in Appendix C. Any desired parameter may be sorted in a similar manner, and the information then printed out automatically from the sorted cards.

IV Actual Data, B (cont.)

The voltage listing of Appendix C was sorted by use of the function code explanation, Table 2, and the sample test requirements data work sheet, Figure 18. The selection of a "blank" for column eight of the Figure 18 data work sheet sorts out the equipment nomenclature. Then by selection of 1 and 2 (from Table 2) in column 24 draws the input and output entries. Next the selection of 1 for column 25 limits the sorting to voltages, and then the selection of 1 and 2 for column 26 draws out both the D-C and the A-C. Thus the input and the output voltage cards, for both A-C and D-C, are sorted out. For clarity the sorting may be shown in table form as follows:

	Column No.			
	8	24	25	26
Title Page Selection	"blank"			
Input and Output Selection		1,2		
Voltage Selection			1	
D-C and A-C Selection				1,2

By restricting the column 24 sorting to number one (1), and column 25 and 26 left as above, the cards would be sorted only for Input Voltages (both A-C and D-C). In the same fashion, any type of data on the cards may be sorted quickly and then printed out automatically on the EAM machine. The versatility of the EAM card system thus becomes readily apparent.

V. OVERALL CONCLUSIONS

The review of the technical manuals and the evaluation of the test requirements illustrates the existing potential for automated building-block module test systems in the field. There are many advantages to be gained in adopting this type of test instrumentation, from the standpoint of operational, technical, and financial factors, as outlined below.

A. OPERATIONAL ADVANTAGES

1. Greater portability and handling ease
2. Reduced "set-up" and "take-down" time

V Overall Conclusions, A (cont.)

3. Improved ruggedness (due to solid-state circuitry)
4. Reduced operator training time
5. Lessened operator skill requirements
6. Reduction of total testing time
7. Permanent record of test measurements
8. Uniform programmed test procedures.

B. TECHNICAL ADVANTAGES

1. Greater test repeatability (due to uniform test set-ups and solid state circuitry).
2. Improved reliability
3. Reduced and simplified maintenance.

C. FINANCIAL ADVANTAGES

1. Lower overall cost (due to elimination of redundant test instruments).
2. Greater system efficiency, based on operational and technical advantages in A and B, above.
3. Simplicity of modernization by sub-module substitution.

A practical approach to designing an automatic, integrated building block system investigated as a sample case was the final test procedure for the AN/PRC-6. An automated test procedure for the building-block method, drawn up and compared to the conventional procedure, paragraph IV,A,4,b of this report, shows the possible reduction and simplification of steps the building-block system offers. This application exercise was not carried to the breadboard design and fabrication, but was advanced almost to this point before the program was redirected.

The data collected through the two phases of the program represents a tabulation of technical manuals covering 85 pieces of prime Army electronic equipment. The test measurement ranges and the list of applicable test instruments in each case are key-punched on EAM cards, available for convenient recall on the sorting machine and printer. Also the information is printed out in the summaries in Appendixes A, B, C, and D for review.

VI. RECOMMENDATIONS

First, obtain the Test Requirements Data for all the pertinent Army prime electronic equipments used in the field, which have not already been tabulated on this program. This would probably have to be done by the Army, working internally through the Commands, extending the search for technical manuals or service handbooks into the laboratories and to the equipment manufacturer, if necessary.

Secondly, use the additional manuals and handbooks to complete the test requirements tabulation. With this data, an evaluation of the total testing need, the total test instrumentation scope, and the technical problems involved could be made, using the EAM cards for detailed data extraction.

Thirdly, undertake an advanced study and application exercise, establishing the combination of test instrumentation desired in a given building block module system and the design characteristics which must be met, thus completing the design criteria.

VII. IDENTIFICATION OF KEY TECHNICAL PERSONNEL

The following key technical personnel were employed on this project. The assignments and percentages of time are as indicated:

<u>Name and Title</u>	<u>Responsibility or Work Assignment</u>	<u>Time Allocated to Project</u>
R. S. Megerle, Manager Support Systems	Task Manager	5%
R. A. Orr Principal Engineer	Project Manager	5%
B. W. Vinton Asst. Senior Engineer	Project Engineer	50%
N. A. Simpson Test Engineer (A)	Asst. Project Engineer	75%

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VII Identification of Key Technical Personnel (cont.)

<u>Name and Title</u>	<u>Responsibility or Work Assignment</u>	<u>Time Allocated to Project</u>
D. E. Rands Analyst	Data Evaluation	75%
J. B. Quinn Development Engineer	Test Requirements Data Tabulation	10%
J. R. Cecka Development Engineer (A)	Test Instrumentation	5%
R. G. Kroeger Development Engineer	Test Requirements Data Tabulation	5%
K. O. Burde Computer Scientist	Data Tabulation	5%
R. L. Brooks Test Engineer	Test Requirements	5%

TABLE 1

EQUIPMENT RATING FACTORS

<u>Nomenclature</u>	<u>Item No.</u>	<u>Population Factor</u>	<u>Complexity Factor</u>
TA-312/PT	678260	1.328	.06
AN/PRC-10	643800	.672	.55
RT-196/PRC-6	643500	.712	.49
RT-77/GRC-9	653400	.022	1.15
RT-67/GRC	658427	.002	1.03
IM-93/UD	634670	.985	.05
RT-174/PRC	643600	.327	.53
R-108/GRC	635660	.004	.68
RT-175/PRC	643700	.060	.60
AN/TPS-25	634479	.001	.64
TA-1/PT	676870	.609	.01
TR-178/ARC-27	636904	.001	.60
AN/GRA-6	611280	.517	.02
R-395/PRD-1	613550	.002	.46
AN/MPQ-4A	634425	.003	.39
TH-5/TG	629782	.015	.32
AN/GRC-39	657225	.010	.32
T-195/GRC-19	640701	.028	.25
AN/GRR-5	641600	.015	.26
AN/PRS-3	613150	.121	.13
AN/TCC-11	660650	.012	.22
AN/FPN-33	634395	.001	.21
SB-22/PT	672380	.138	.06
AM/65/GRC	621266	.156	.03
CV-2/TX	611390	.001	.16

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TABLE 1 (cont.)

<u>Nomenclature</u>	<u>Item No.</u>	<u>Population Factor</u>	<u>Complexity Factor</u>
J-668/GR	657222	.048	.10
TT-1/TXC-1	615550	.001	.14
TA-182/U	611498	.016	.09
T-642/GRN	605485	.001	.10
RC-289	660360	.005	.09
AN/TRD-10	613567	.002	.08
AN/TMQ-5	658160	.001	.08
AN/URC-4	647800	.050	.02
AN/GMD-1A	658250	.001	.06
AN/TNS-3	667000	.005	.01

TABLE 2

FUNCTION CODE EXPLANATION

COL.	24	25	26	27
DIGIT	0	0	0	0
	1st	2nd	3rd	4th

1st Digit: 1 = Input (from a stimulus generator)
2 = Output (to a measuring instrument)

2nd Digit: 1 = Voltage
2 = Current
3 = Power
4 = Freq. and phase
5 = Modulation and intelligence
6 = Time
7 = Impedance
8 = (Open)
9 = Miscellaneous accessories

3rd Digit: 1 = DC
2 = AC
3 = Audio
4 = IF
5 = RF
6 = Microwave
7 = Pulse

4th Digit: 1 = AM
2 = FM
3 = Pulse
4 = Complex wave

Table 2

TABLE 3

CODE KEY FOR VALUES AND UNITS

Kilovolts	KV
Volts	V
Millivolts	MV
Microvolts	uV
Amperes	A
Milliamperes	MA
Microamperes	uA
Kilowatts	KW
Watts	W
Milliwatts	MW
1000 Megohms	KMO
Kilohms	KO
Ohms	O
Kilomegacycles	KMC
Megacycles	MC
Kilocycles	KC
Cycles	C
Microfarad	uF
Seconds	S
Minutes	M
Hours	H

Table 3

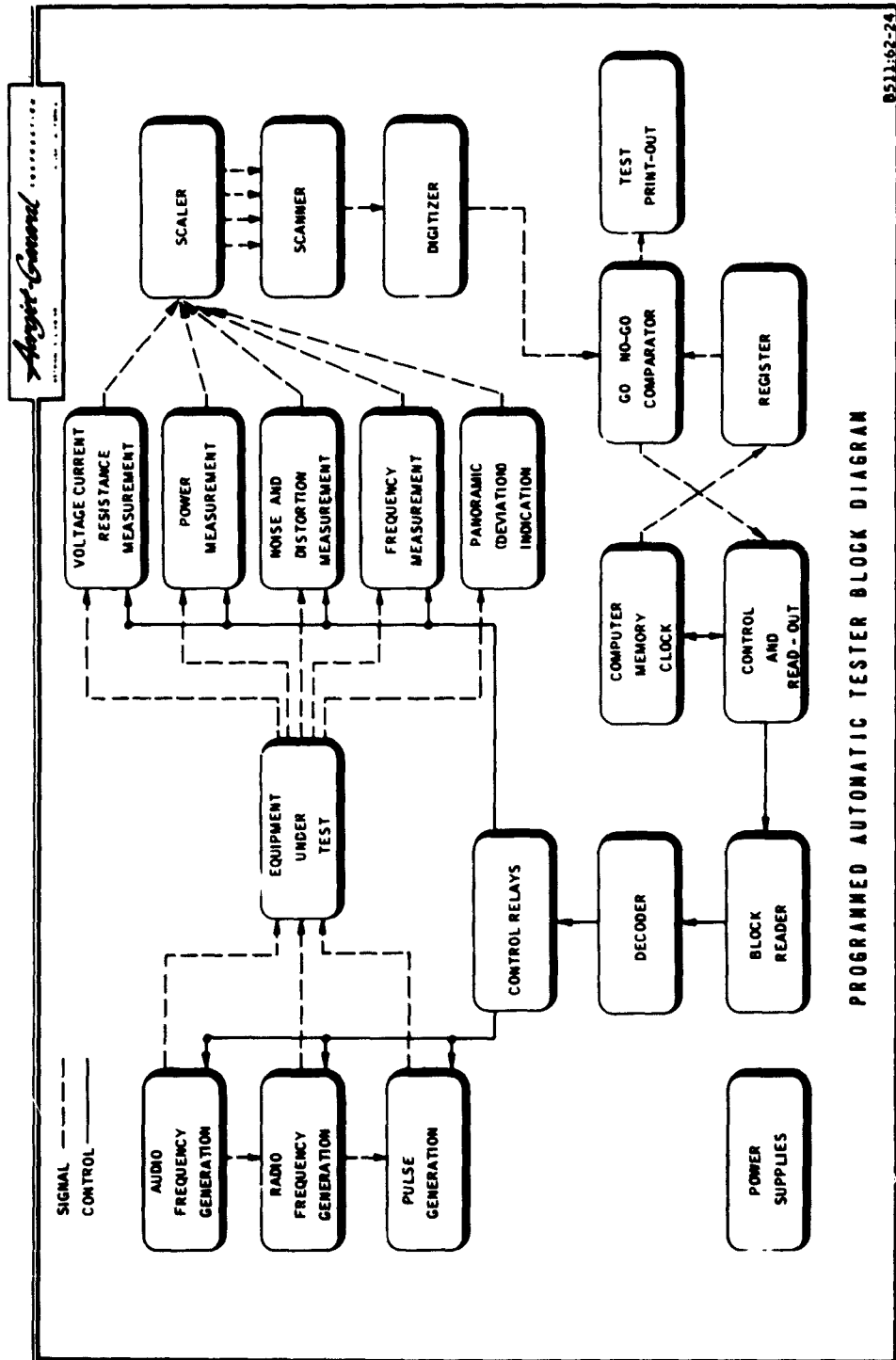


Figure 1

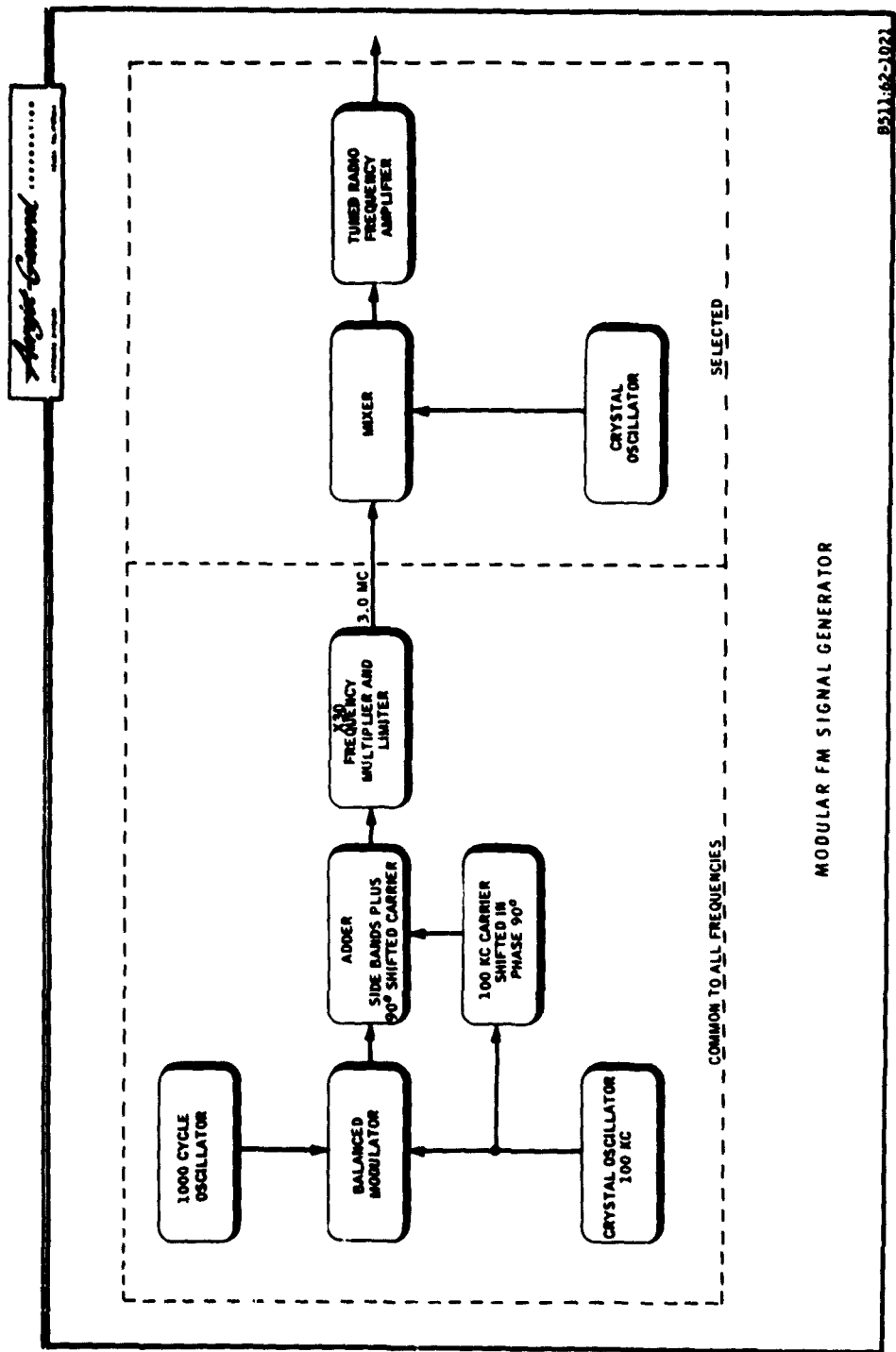


Figure 2

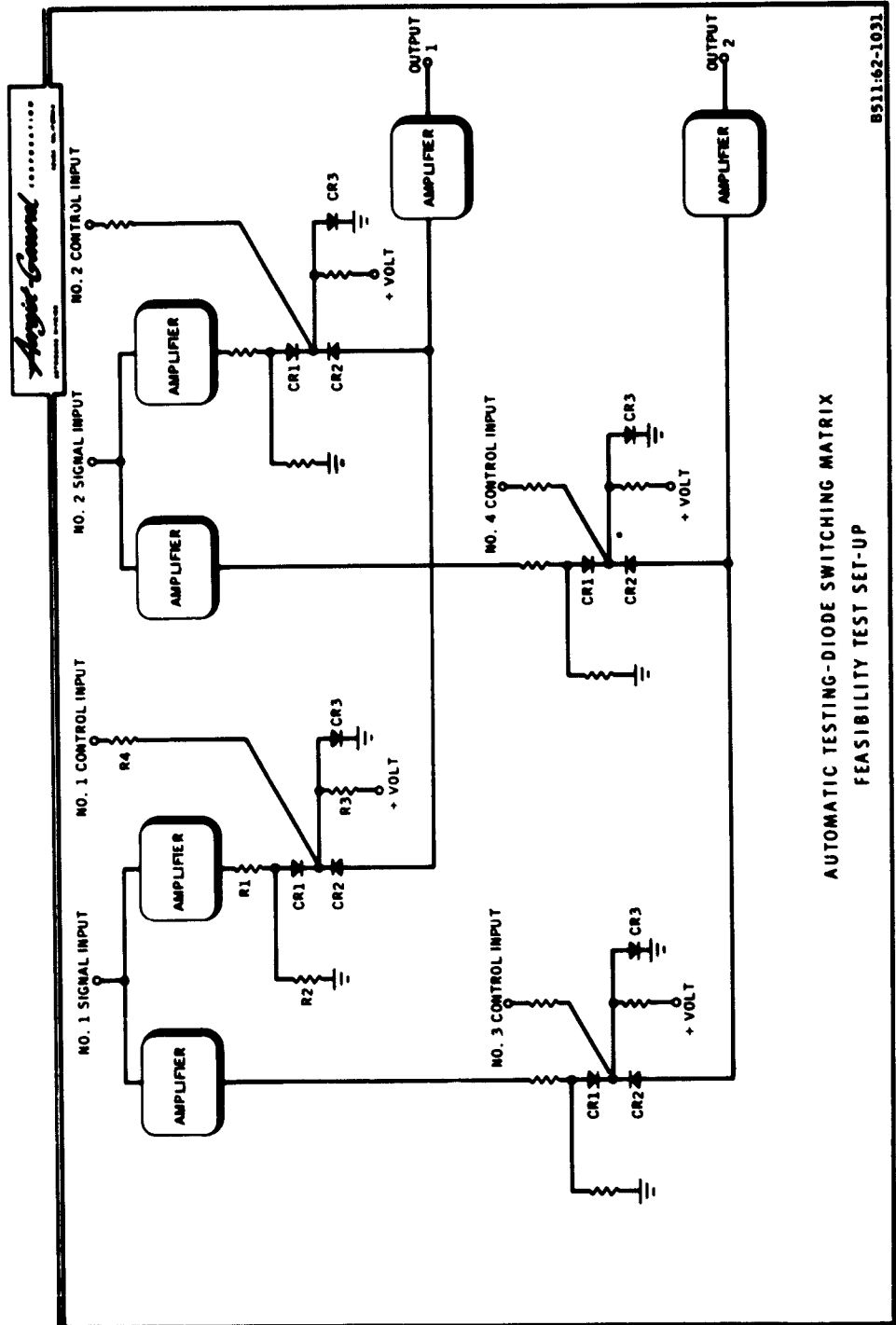
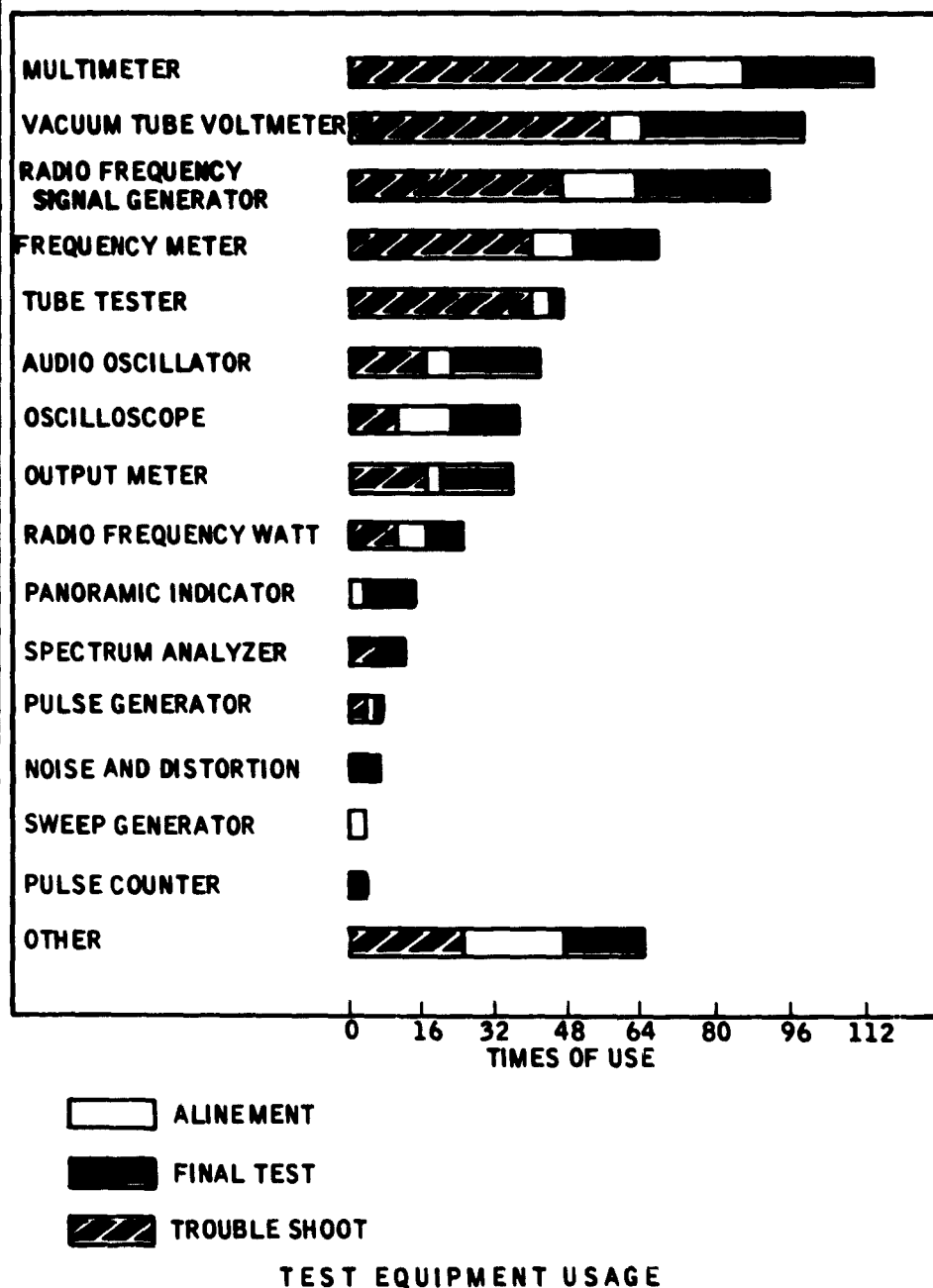


Figure 3



A511:62-7

Figure 4

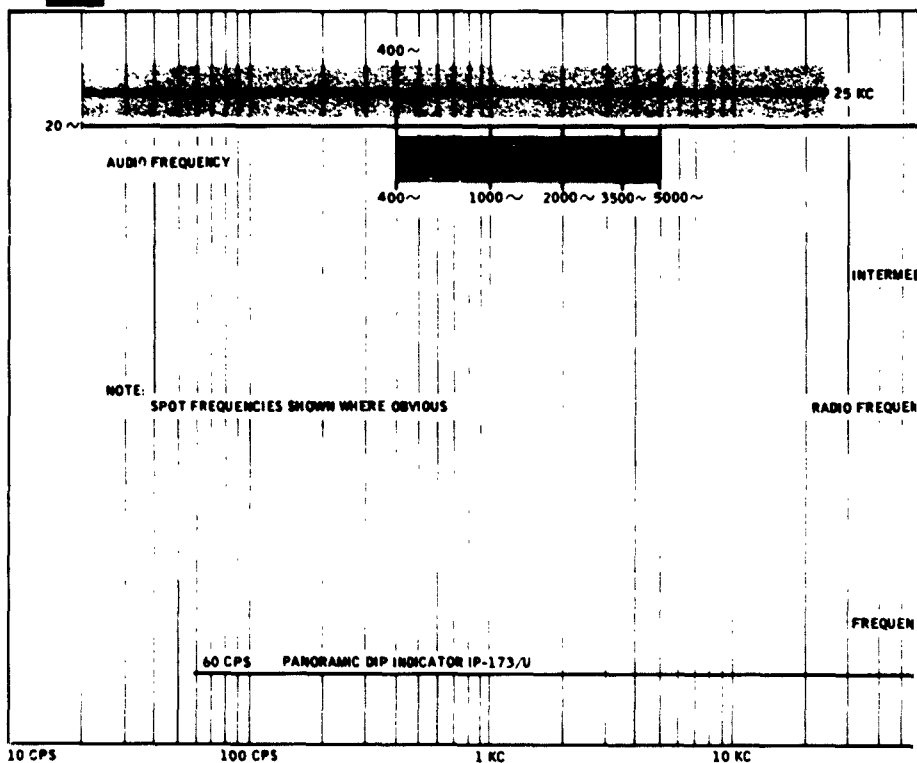
Aurigel-General CORPORATION
ASTROPHYSICS DIVISION AZUSA, CALIFORNIA

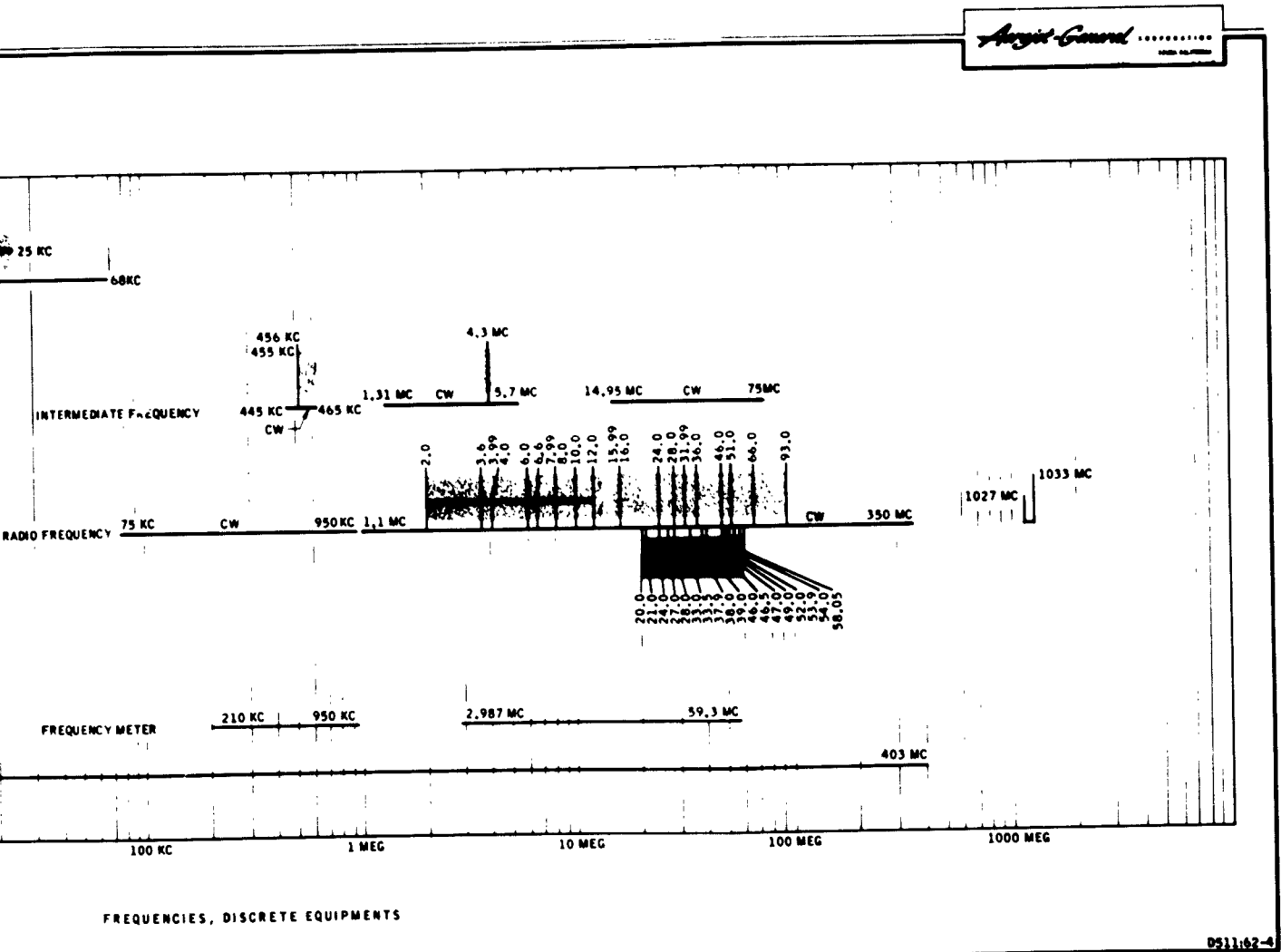
TYPE	TROUBLE SHOOT	ALINEMENT	FINAL TEST	TOTAL	RATING
MULTIMETER	69	16	29	114	1
RF SIGNAL GENERATOR	47	17	29	93	3
FREQUENCY METER	41	9	19	69	4
OSCILLOSCOPE	11	12	15	38	8
TUBE TESTER	42	4	2	48	6
PANORAMIC INDICATOR	3		11	14	11
RADIO FREQUENCY WATTMETER	11	6	8	25	10
VACUUM TUBE VOLTMETER	58	6	37	101	2
AUDIO OSCILLATOR	16	6	20	42	7
OUTPUT METER	17	3	16	36	9
SWEEP GENERATOR		3		3	15
SPECTRUM ANALYZER	6		6	12	12
NOISE AND DISTORTION METER			6	6	14
PULSE GENERATOR	3	2	2	7	13
PULSE COUNTER	2		1	3	16
OTHER	27	22	18	67	5

TABULATION OF TEST EQUIPMENT

A511:62-6

AM = 
FN = 





DS11162-4



Figure 6



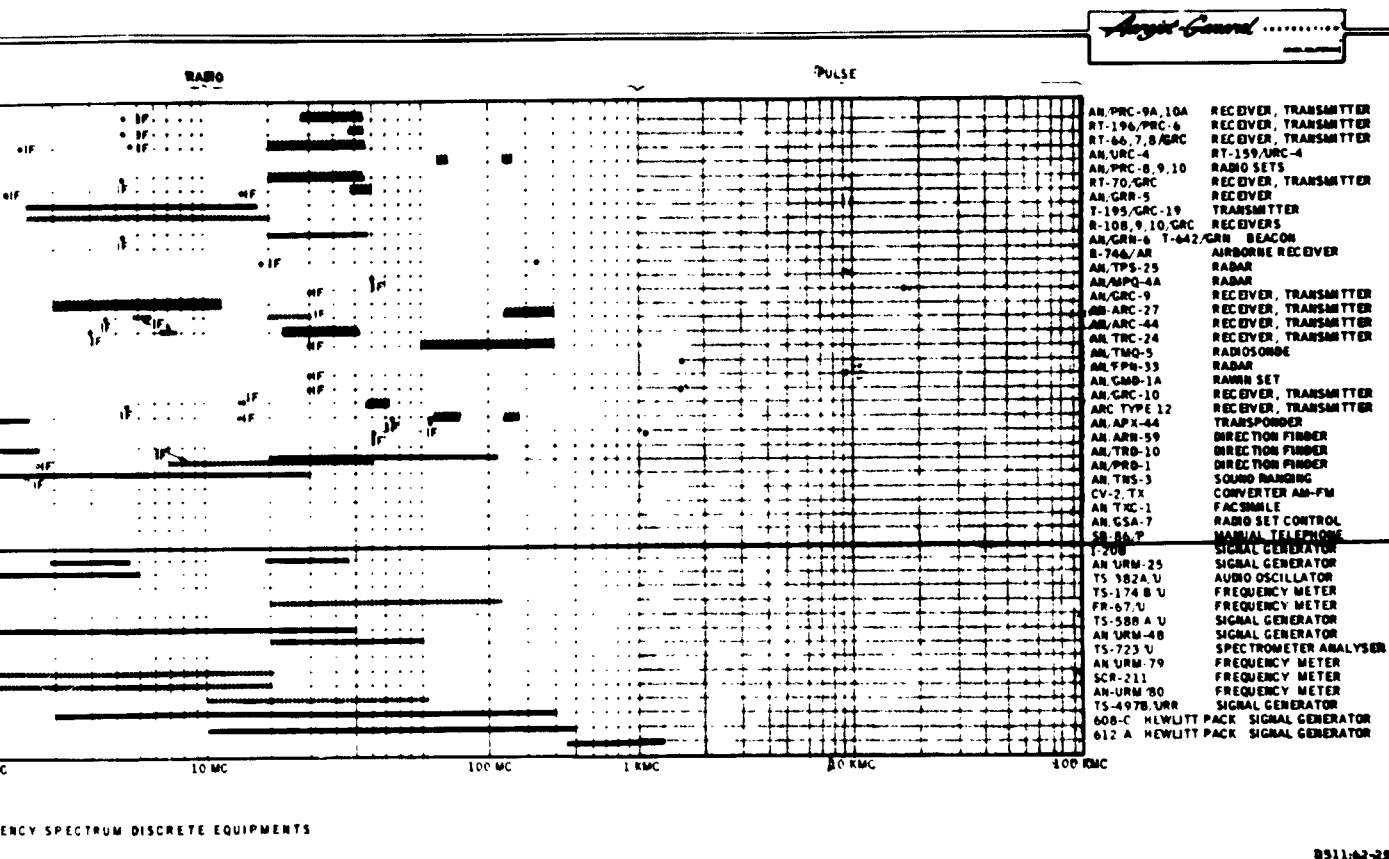
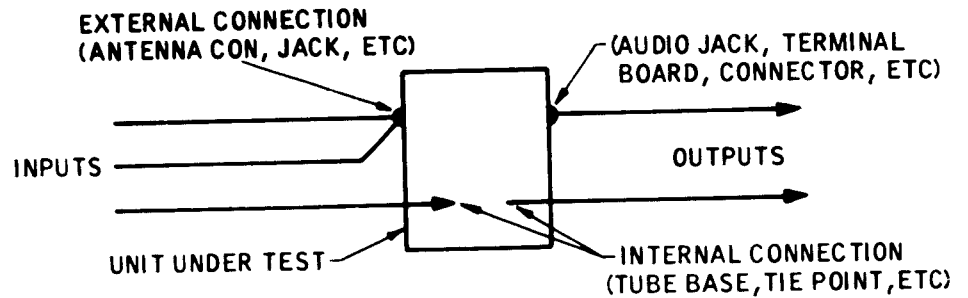
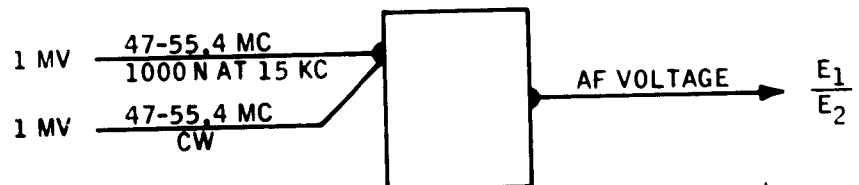


Figure 7

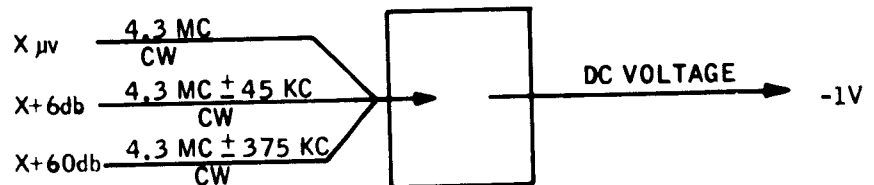


EXAMPLE

1. SENSITIVITY



2. SELECTIVITY



PROCEDURE FOR DIAGRAMING INPUT AND OUTPUT FUNCTIONS

A511:62-28

Figure 8

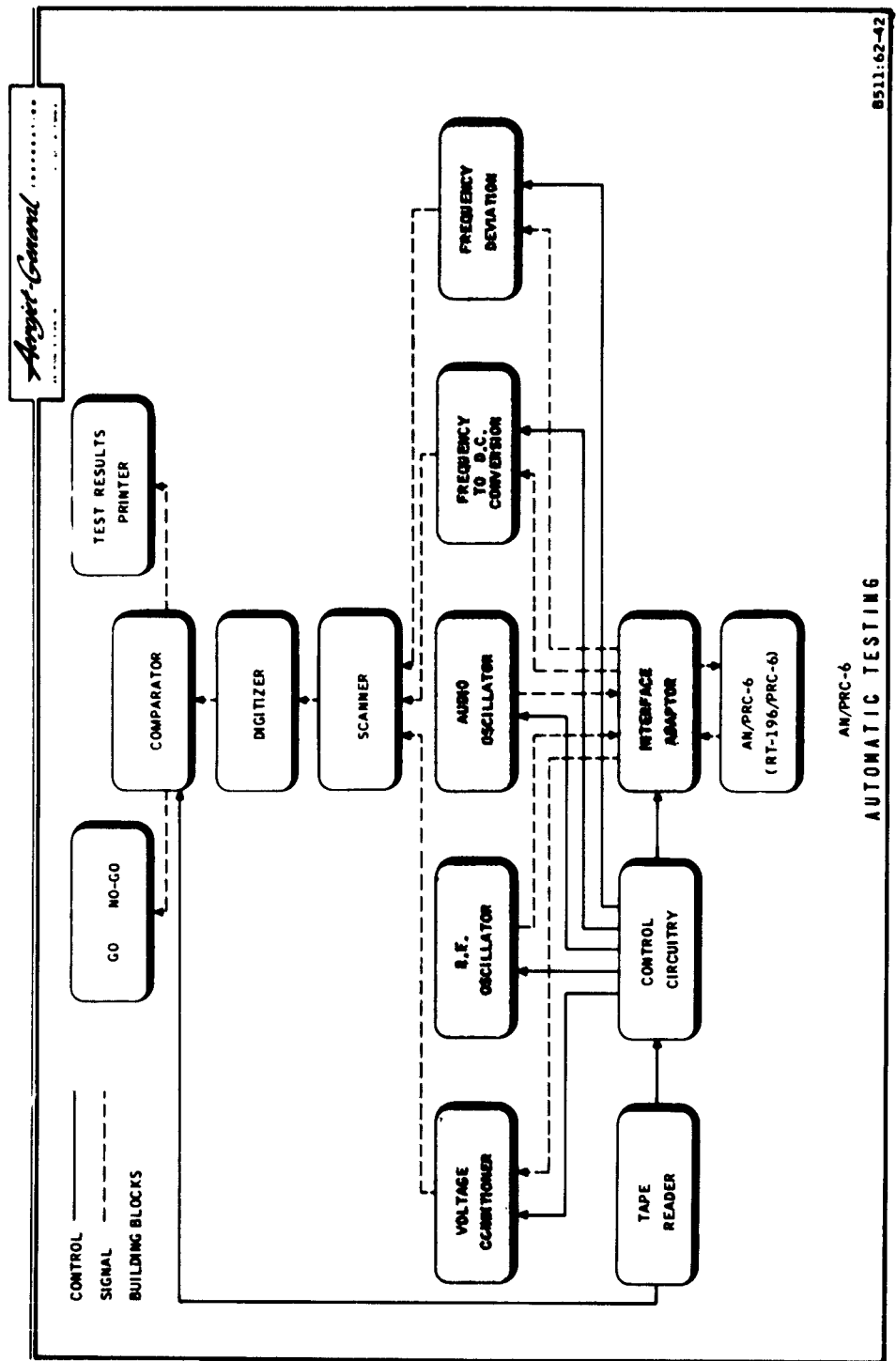


Figure 9

ARMY FM COMMUNICATION EQUIPMENT, 20 TO 70 MC			
EQUIPMENT	TESTS PERFORMED		TEST RANGES
	RECEIVER	TRANSMITTER	
AN/PRC-6	AUDIO DE EMPHASIS NOISE LEVEL	AUDIO PRE EMPHASIS MODULATION SENSITIVITY	VOLTAGES TO TWO KV RESISTANCES TO 10 MEGOHMS DB FROM -60 TO +40
AN/GRC-10, 39	I. F. BANDWIDTH OUTPUT LEVELS	POWER OUTPUT AUTOMATIC FREQUENCY CONTROL	RF: 20 70.9 MC IF: 1.4 - 16.05 MC
AN/PRC-8	SENSITIVITY	F. M. DEVIATION	
AN/PRC-9	AUTOMATIC FREQ. CTL	FREQUENCY	DISCRETE: 250C, 400C, 1 KC, 2.5 KC, 5 KC
AN/PRC-10	DISTORTION	SUPPLY VOLTAGES	
AN/PRC-9A	SELECTIVITY		
AN/PRC 10A	SPURIOUS RESPONSE LIMITING		5 TO 10 PERCENT DISTORTION MINUS 50DB NOISE
RT-70/GRC	DISCRIMINATOR BANDWIDTH		
RT-70A/GRC	SUPPLY VOLTAGES		1/4 WATT TO 40 WATTS
RT-66/GRC			
RT-67/GRC			FM DEVIATION UP TO 50 KC EACH SIDE OF CARRIER
RT-68/GRC			
AN/ARC-44			

BS11:62-39

Figure 10

						AN/TRC-24																			
ITEM						C SEQ.						EQUIPMENT NOMENCLATURE													
T REQUIREMENTS																									
ITEM (1)						C SEQ. (3)						TEST EQUIPMENT NOMENCLATURE (4)						FUNCTION DESCRIPTION						FUNCTION CODE (5)	
1						6 7 8 10 11						23						24							
						000AN/TRC-24																			
						001AN/GRC-75																			
						002AN/GRC-78																			
						003AN/GRC-81																			
						004AN/TRC-95																			
						005AN/GRC-76																			
						006AN/GRC-79																			
						007AN/GRC-82																			
						008AN/TRC-36																			
						009AN/GRC-77																			
						010AN/GRC-80																			
						011AN/GRC-83																			
						012T-302/TRC																			
						013P-685/TRC																			
						014R-417/TRC																			
						015TF-167/TRC																			
						016H-90/U																			
						017J-532/U																			
						018SA-331/U																			
						019ME-82/U																			
						020PU-286/G																			
						021AN/TEE-3																			
						022AN/TEE-7																			
						023AM-913/TRC																			
						024AM-914/TRC																			
						025AM-912/TRC																			
						026AM-915/TRC																			
						027AN-TRA-25																			
						028T-302/TRC																			
1						6 7 8 10 11						23						24							

TEST REQUIREMENTS DATA SHEET

W. RANDALL

9-12-61

PREPARED

DATE

Sample of Test Require

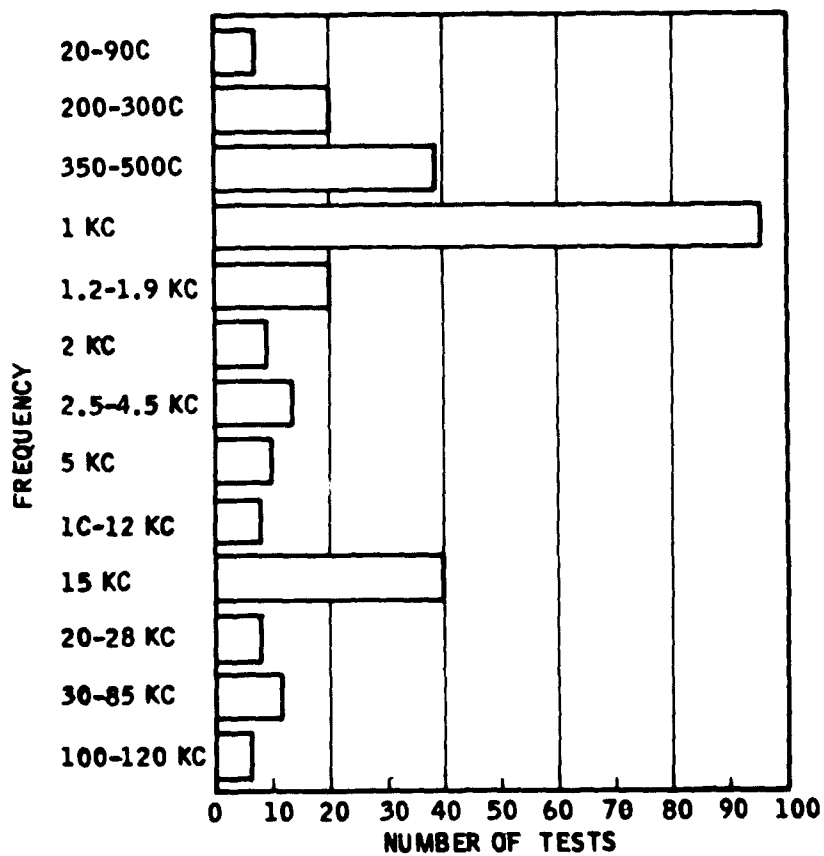


600000	AN/TRC-24	RADIO SET	052660	TM11-687
	AN/TRC-24 T-302/TRC	R-417/TRC 100-400MC FM VOICE+CARRIER FONE		
	TA-182/U	SIGNAL CONVERTER		
	AN/TRC-24	RADIO SET		
	1AN/GRC-75	RADIO SET	PART OF RADIO SET AN/TRC-24	
	2AN/GRC-78	RADIO SET	PART OF RADIO SET AN/TRC-24	
	3AN/GRC-81	RADIO SET	PART OF RADIO SET AN/TRC-24	
	4AN/TRC-35	RADIO TERMINAL SET	PART OF RADIO SET AN/TRC-24	
	5AN/GRC-76	RADIO TERMINAL SET	PART OF RADIO SET AN/TRC-24	
	6AN/GRC-79	RADIO TERMINAL SET	PART OF RADIO SET AN/TRC-24	
	7AN/GRC-82	RADIO TERMINAL SET	PART OF RADIO SET AN/TRC-24	
	8AN/TRC-36	RADIO RELAY SET	PART OF RADIO SET AN/TRC-24	
	9AN/GRC-77	RADIO REPEATER SET	PART OF RADIO SET AN/TRC-24	
	10AN/GRC-80	RADIO REPEATER SET	PART OF RADIO SET AN/TRC-24	
	11AN/GRC-83	RADIO REPEATER SET	PART OF RADIO SET AN/TRC-24	
	12T-302/TRC	RADIO TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	13PP-685/TRC	POWER SUPPLY	PART OF RADIO SET AN/TRC-24	
	14R-417/TRC	RADIO RECEIVER	PART OF RADIO SET AN/TRC-24	
	23AM-913/TRC	B BAND RECEIVER	PART OF RADIO SET AN/TRC-24	
	24AM-914/TRC	C BAND RECEIVER	PART OF RADIO SET AN/TRC-24	
	25AM-912/TRC	B BAND TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	26AM-915/TRC	C BAND TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	28T-302/TRC	F BAND TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	43AM-1179/GRC	A BAND RECEIVER	PART OF RADIO SET AN/TRC-24	
	44AM-1177/GRC	D BAND RECEIVER	PART OF RADIO SET AN/TRC-24	
	45AM-1180/GRC	A BAND TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	46AM-1178/GRC	D BAND TRANSMITTER	PART OF RADIO SET AN/TRC-24	
	470A-1387/GRC	RADIO SET GROUP	PART OF RADIO SET AN/TRC-24	
	100AN/TRC-24		POWER REQUIREMENTS	

Electric Accounting Machine Sheets for AN/TRC-24

101PU-286/G	112	90	V260	V	115V, 50-60C, 185 W .95 PF
102PP-685/TRC	211	150	V		REG 275 MA
103PP-685/TRC	211	250	V		UNREG 10 MA
104PP-685/TRC	211	200	V350	V	REG 35 MA
105PP-685/TRC	211	12	V		-12 VDC 75 MA
106PP-685/TRC	211	300	V900	V	500 MA UNREG
107PP-685/TRC	212	25	V 63	V	2.5 VAC 6.25 AMP
108PP-685/TRC	212	115	V		115 VAC AT 2 AMP
200AN/TRC-24					TROUBLESHOOTING
201SG-71/FCC			AUDIO OSCILLATOR		FOR SIG SUBSTITUTION
202ME-30A/U			VOLTMETER		FOR SIG SUBSTITUTION
203TS-505/U			ELECTRONIC MULTIMETER		FOR SIG SUBSTITUTION
204AN/URM-70			FM SIG GENERATOR		FOR SIG SUBSTITUTION
205TS-497/URR			SIGNAL GENERATOR		FOR SIG SUBSTITUTION
206TS-352/U			MULTIMETER		FOR SIG SUBSTITUTION
207TS-569/FT			TRANS MEAS SET DB MTR		FOR SIG SUBSTITUTION
208TF-167/TRC			AUTOTRANSFORMER		PART OF RADIO SET AN/TRC-24
209TV-7/U			ELECTRON TUBE TEST SET		PART OF RADIO SET AN/TRC-24
210AN/TRC-24					TROUBLESHOOTING (CONTD)
213TS-505/U	211	05	V910	V	
219SG-71/FCC	1552	24	KC		24 KC/85 KC PK/161.75 MC
300AN/TRC-24					ALINEMENT
303SG-71/FCC	213	0	DBM 14	DBM10	
304SG-71/FCC	213	2	V	10	RMS
306TS-505/U	212	13	V 551	V 5	
308AN/URM-80	245	98	MC 81125	MC 1	
309TS-497/URR	245	10125	MC 95	MC 1	
310TS-497/URR	215	20	UV100	MV 5	
311AN/URM-70	245	50125	MC22975	MC 1	MOD 1KC WITH 15.5 KC DEV.

312AN/URM-70	215	3	MV 10	MV 5	
314ME-82/U	245	50125	MC224750	MC 5	
315ME-82/U	235	4	W 15	W10	
400					FINAL TESTING
401SG-71/FCC			AUDIO OSCILLATOR		
402ME-30A/U			VOLTMETER		
403TS-505/U			ELECTRONIC MULTIMETER		
404TS-352/U			MULTIMETER		
405AN/URM-80			FREQUENCY METER		
406AN/URM-81			FREQUENCY METER		
407AN/URM-32			FREQUENCY METER		
408IP-173/U			PANORAMIC INDICATOR		
409AN/URM-70			FREQUENCY METER		
410TS-497/URR			SIGNAL GENERATOR		
411PAD			6 DB PAD 72 OHM		
412PAD			6 DB PAD 50 OHM		
413SG-92/U			SIGNAL GENERATOR		
414OS-8A/U			OSCILLOSCOPE		
415TS-569/FT			TRANS MEAS SET		
416FILTER			5 KC FILTER		
417FILTER			10 KC FILTER		
418ME-6/U			ELEC MULTIMETER		
419SG-71/FCC	243	250	C 90	KC 1	
420TS-497/URR	245	30	MC3995	MC 1	
421TS-497/URR	215	100	UV200	UV 5	
422TS-505/U	213	137	MV 382	V 5	
423AN/URM-80	245	10025	MC22590	MC 1	
424AN/URM-70	245	99	MC400	MC 1	MOD 24KC AT 85KC DEV
425AN/URM-70	215	6	UV 15	MV 5	VAR MOD 250C TO 4KC



FREQUENCY TABULATION 20 C - 120 KC

A511:6229

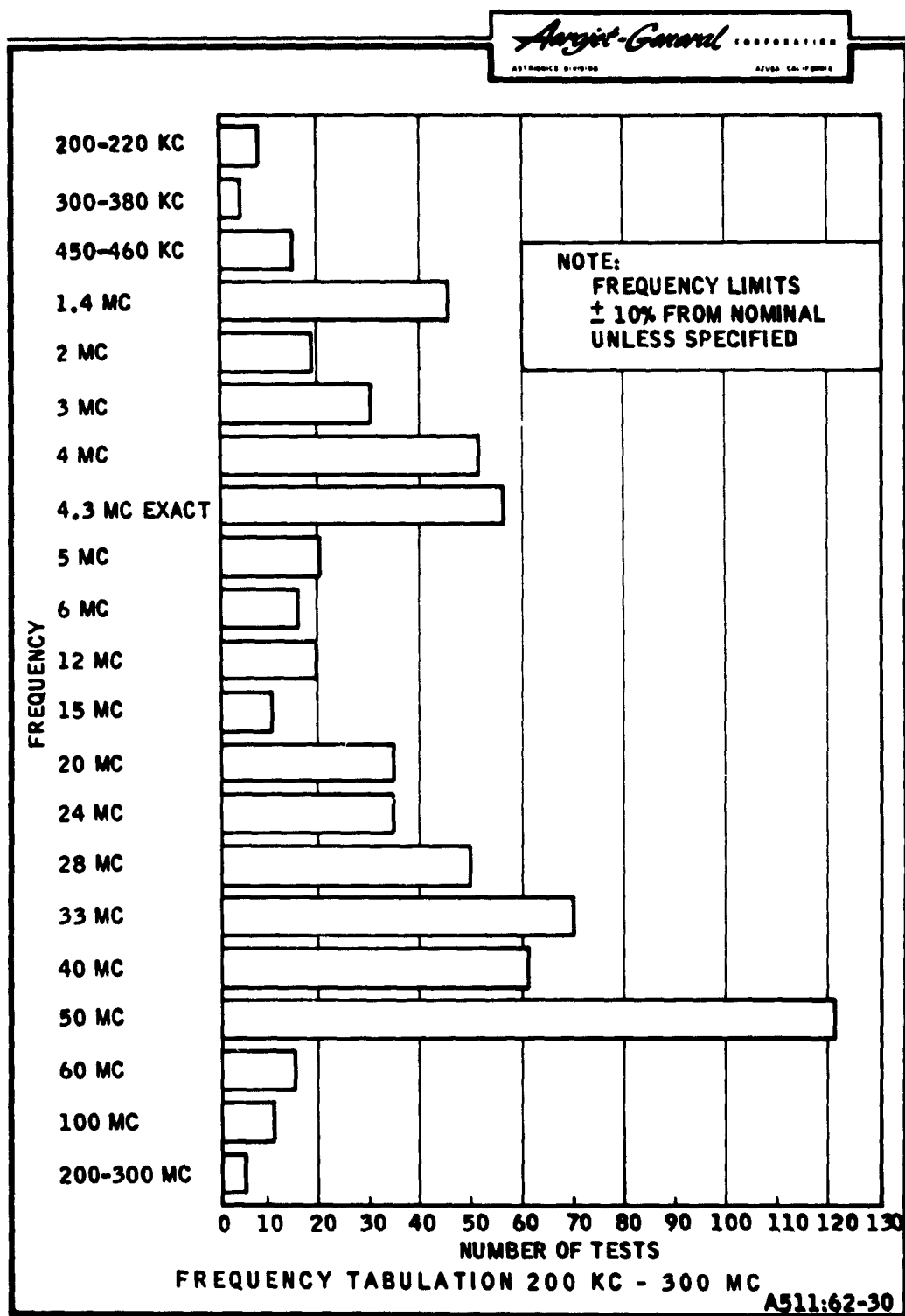
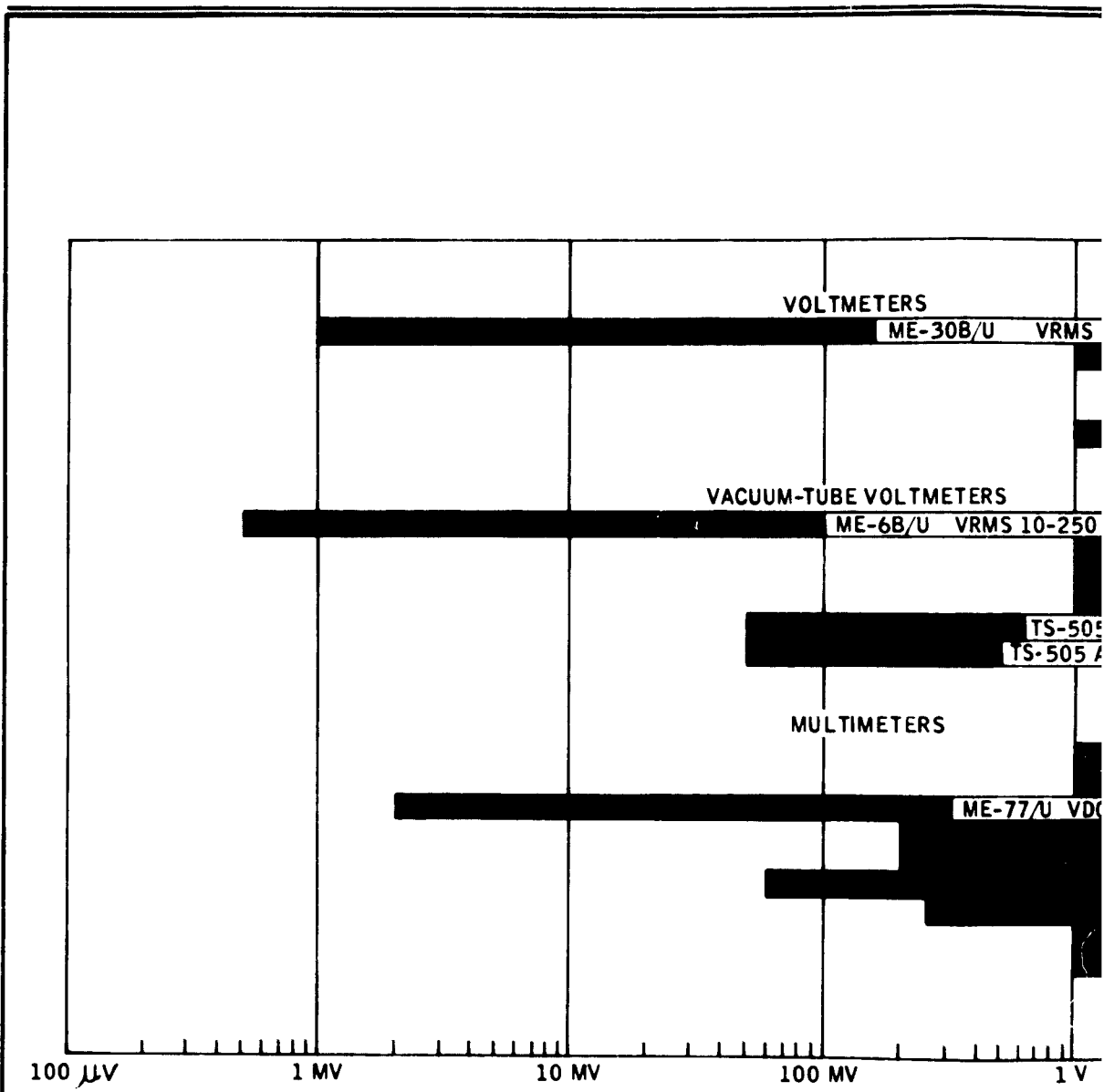


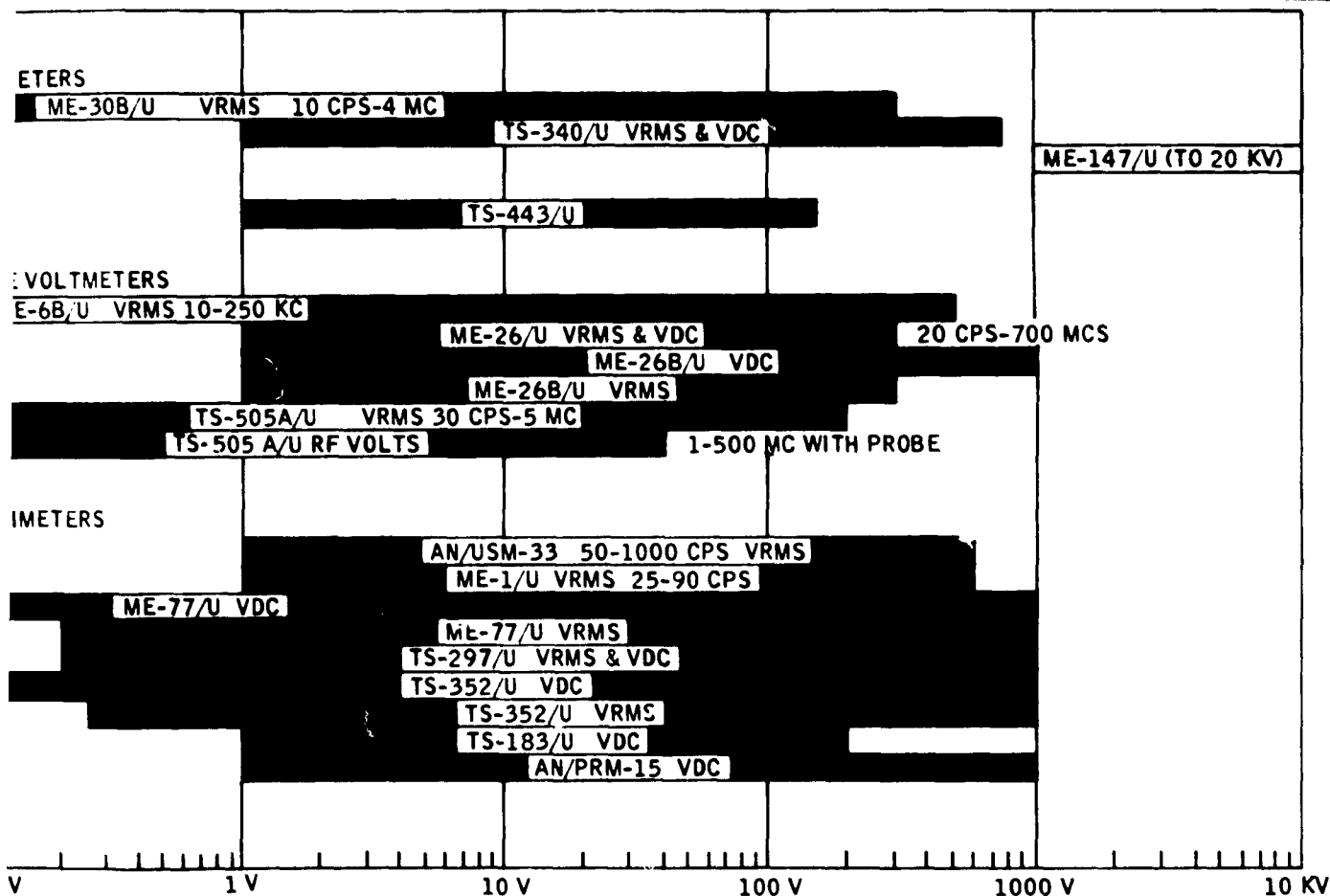
Figure 14



RANGE OVERLAP IN VOLTAGE ON VACUUM-TUBE VOLT METER

Aerjet-General CORPORATION

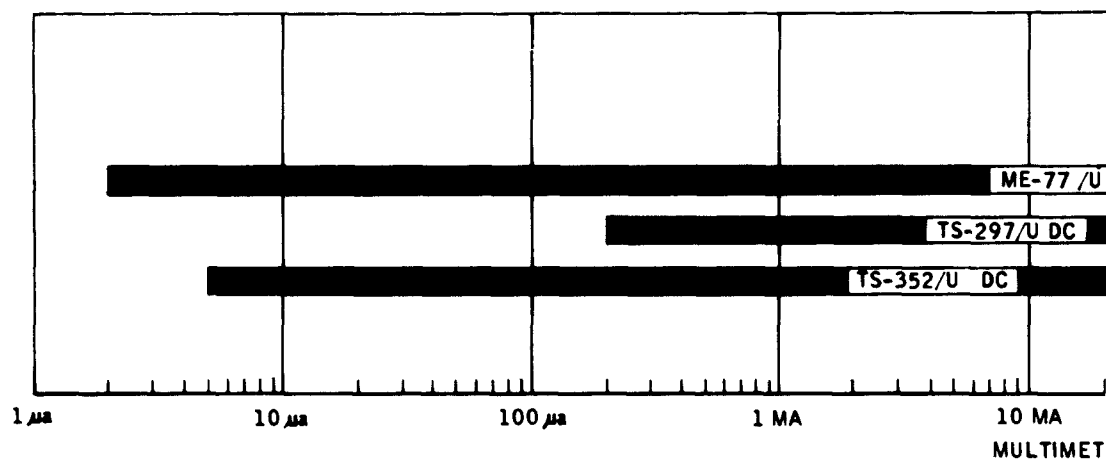
AZUSA, CALIFORNIA

2

IN VACUUM-TUBE VOLTMETERS, VOLTMETERS, AND MULTIMETERS

B511:62-186

Figure 1:

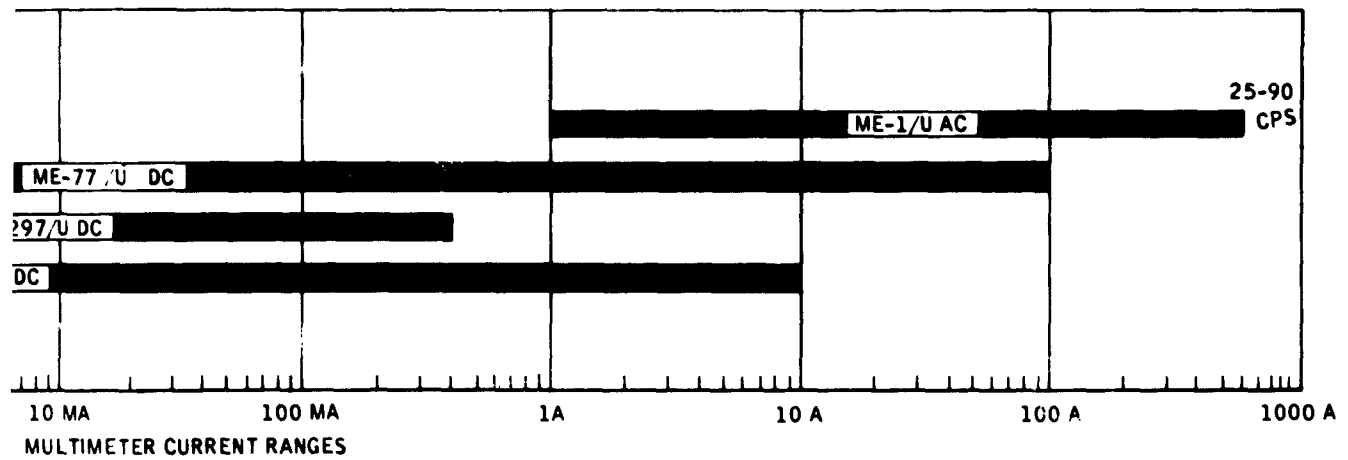


RANGE OVERLAP IN

1

Aargit-General CORPORATION

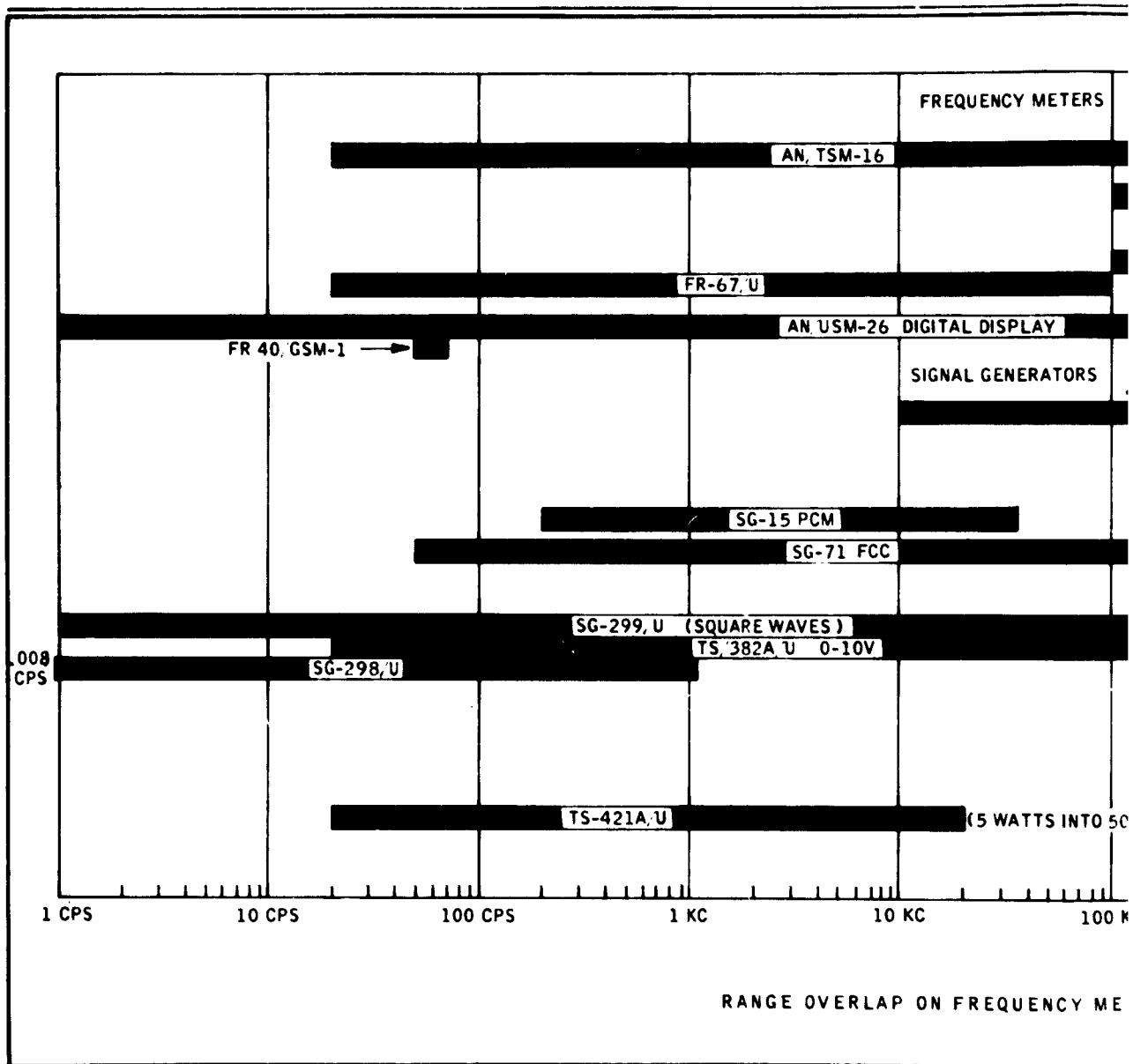
AJUSA, CALIFORNIA



ERLAP IN CURRENT ON MULTIMETERS

C511:62-228

Figure 10



1

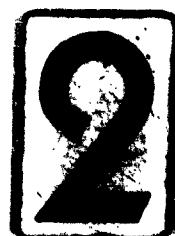
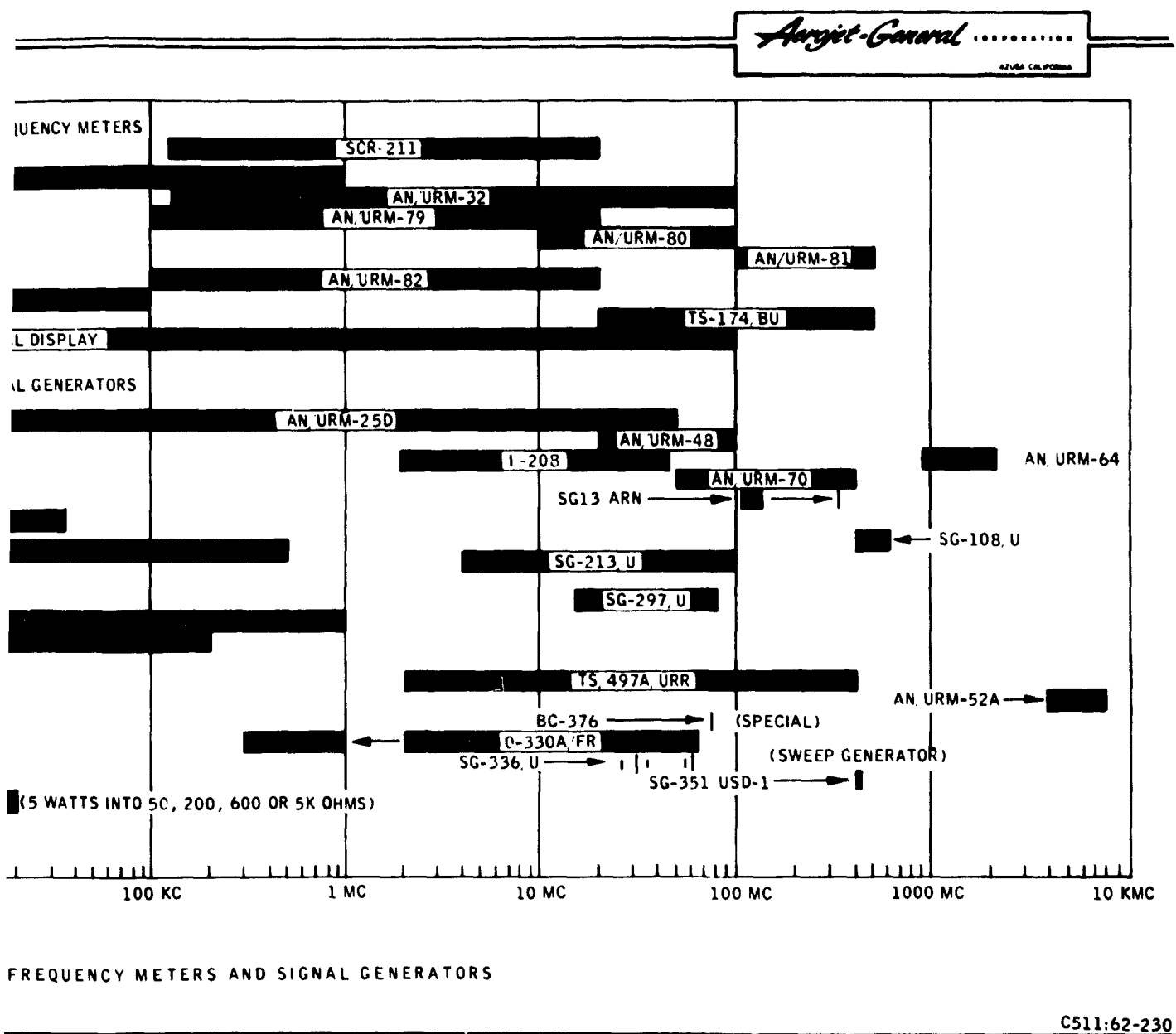


Figure 17

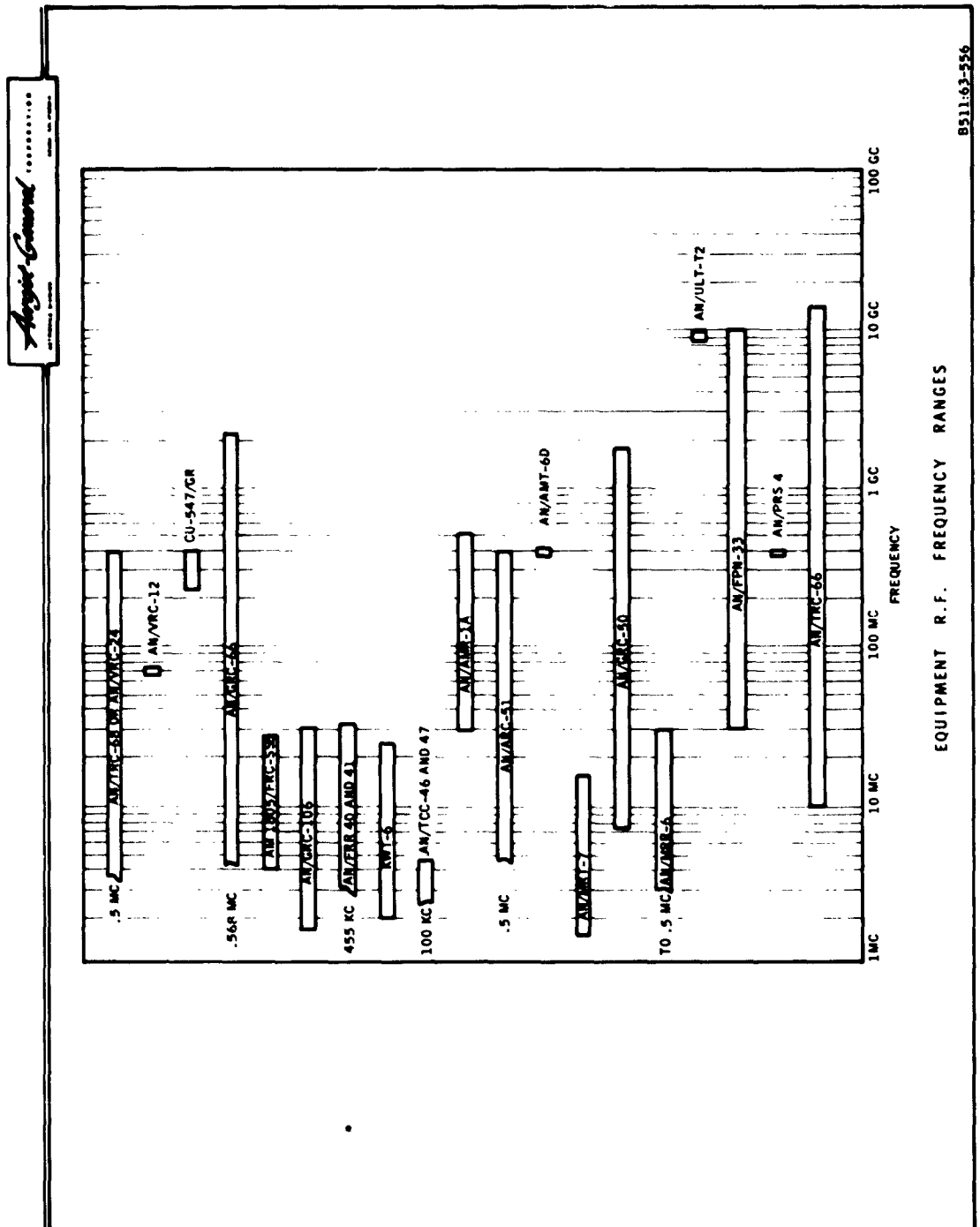


Figure 18

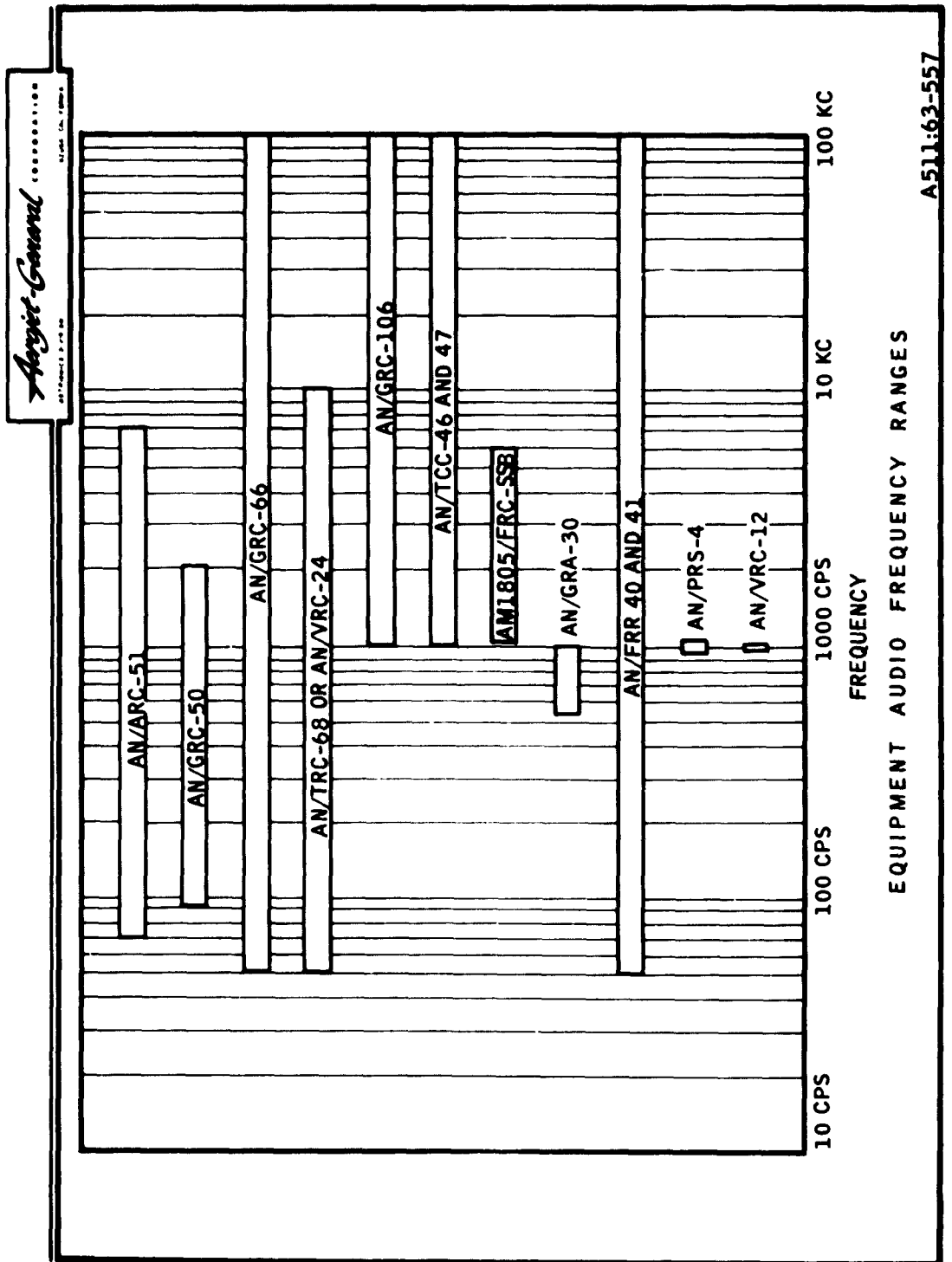


Figure 19

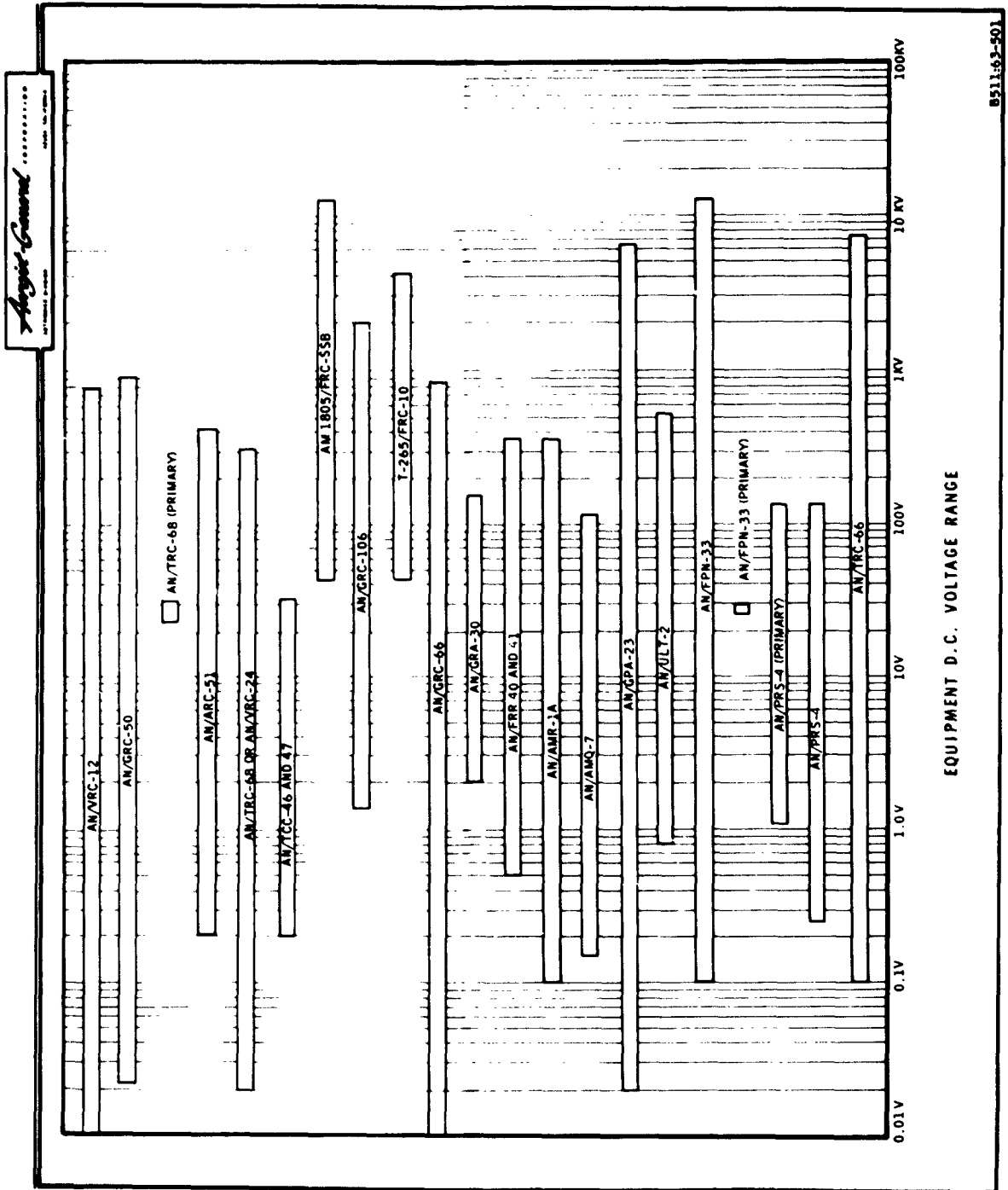
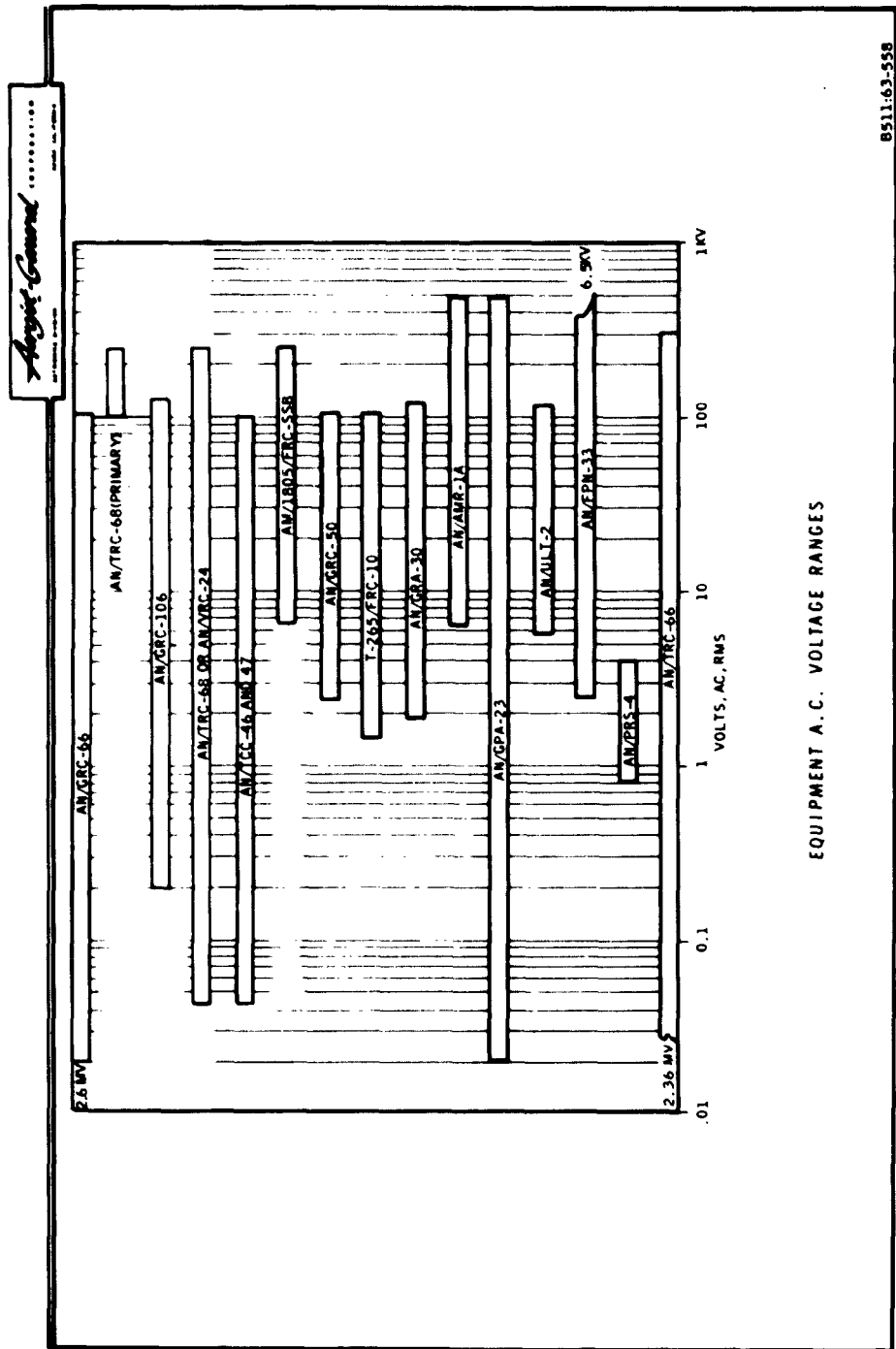


Figure 20



8511-63-558

Figure 21

Report No. 2535

APPENDIX A

PHASE ONE SUMMARY SHEETS

Report No. 2535

APPENDIX A

PHASE ONE SUMMARY SHEETS

Report No. 2535

AN/TRC-24	RADIO SET	052660	TM11-687
AN/TRC-24 T-302/TRC	R-417/TRC 100-400MC FM VOICE+CARRIER FONE		
TA-182/U	SIGNAL CONVERTER		
AN/TRC-24	RADIO SET		
1AN/GRC-75	RADIO SET	PART OF RADIO SET	AN/TRC-24
2AN/GRC-78	RADIO SET	PART OF RADIO SET	AN/TRC-24
3AN/GRC-81	RADIO SET	PART OF RADIO SET	AN/TRC-24
4AN/TRC-35	RADIO TERMINAL SET	PART OF RADIO SET	AN/TRC-24
5AN/GRC-76	RADIO TFRMINAL SET	PART OF RADIO SET	AN/TRC-24
6AN/GRC-79	RADIO TERMINAL SET	PART OF RADIO SET	AN/TRC-24
7AN/GRC-82	RADIO TERMINAL SET	PART OF RADIO SET	AN/TRC-24
8AN/TRC-36	RADIO RELAY SET	PART OF RADIO SET	AN/TRC-24
9AN/GRC-77	RADIO REPEATER SET	PART OF RADIO SET	AN/TRC-24
10AN/GRC-80	RADIO REPEATER SET	PART OF RADIO SET	AN/TRC-24
11AN/GRC-83	RADIO REPEATER SET	PART OF RADIO SET	AN/TRC-24
12T-302/TRC	RADIO TRANSMITTER	PART OF RADIO SET	AN/TRC-24
13PP-685/TRC	POWER SUPPLY	PART OF RADIO SET	AN/TRC-24
14R-417/TRC	RADIO RFCEIVER	PART OF RADIO SET	AN/TRC-24
23AM-913/TRC	B BAND RECEIVER	PART OF RADIO SET	AN/TRC-24
24AM-914/TRC	C BAND RECEIVER	PART OF RADIO SET	AN/TRC-24
25AM-912/TRC	B BAND TRANSMITTER	PART OF RADIO SET	AN/TRC-24
26AM-915/TRC	C BAND TRANSMITTER	PART OF RADIO SET	AN/TRC-24
28T-302/TRC	F BAND TRANSMITTER	PART OF RADIO SET	AN/TRC-24
43AM-1179/GRC	A BAND RECEIVER	PART OF RADIO SET	AN/TRC-24
44AM-1177/GRC	D BAND RECEIVER	PART OF RADIO SET	AN/TRC-24
45AM-1180/GRC	A BAND TRANSMITTER	PART OF RADIO SET	AN/TRC-24
46AM-1178/GRC	D BAND TRANSMITTER	PART OF RADIO SET	AN/TRC-24
470A-1387/GRC	RADIO SET GROUP	PART OF RADIO SET	AN/TRC-24
101PU-286/G	112 90 V260 V	115V,50-60C,185 W .95 PF	
102PP-685/TRC	211 150 V	REG 275 MA	
103PP-685/TRC	211 250 V	UNREG 10 MA	
104PP-685/TRC	211 200 V350 V	REG 35 MA	
105PP-685/JRC	211 12 V	-12 VDC 75 MA	
106PP-685/TRC	211 300 V900 V	500 MA UNREG	
107PP-685/TRC	212 25 V 63 V	2.5 VAC 6.25 AMP	
108PP-685/TRC	212 115 V	115 VAC AT 2 AMP	
213TS-505/U	211 05 V910 V		
1552 5KC-85KC	INPUT RF MOD FM		
213 0V-13.7V	OUTPUT VOLT AUDIO		
215 6UV-100MV	OUTPUT VOLT RF		
235 4W-70W	OUTPUT PWR RF		
243 250C-90KC	OUTPUT FREQ AUDIO		
244 403.2-436.8KC	OUTPUT FREQ IF		
244 30MC IF			
245 30MC-400MC	OUTPUT FREQ RF		
201SG-71/FCC	AUDIO OSCILLATOR	FOR SIG SUBSTITUTION	
202ME-30A/U	VOLTMETER	FOR SIG SUBSTITUTION	
203TS-505/U	ELECTRONIC MULTIMETER	FOR SIG SUBSTITUTION	
204AN/URM-70	FM SIG GENERATOR	FOR SIG SUBSTITUTION	
205TS-497/URR	SIGNAL GENERATOR	FOR SIG SUBSTITUTION	
206TS-352/U	MULTIMETER	FOR SIG SUBSTITUTION	
207TS-569/FT	TRANS MEAS SET DB MTR	FOR SIG SUBSTITUTION	
208TF-167/TRC,	AUTOTRANSFORMER	PART OF RADIO SET	AN/TRC-24
209TV-7/U	ELECTRON TUBE TEST SET	PART OF RADIO SET	AN/TRC-24
406AN/URM-81	FREQUENCY METER		

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405AN/URM-80	FREQUENCY METER
407AN/URM-32	FREQUENCY METER
408IP-173/U	PANORAMIC INDICATOR
409AN/URM-70	FREQUENCY METER
410TS-497/URR	SIGNAL GENERATOR
413SG-92/U	SIGNAL GENERATOR
414OS-8A/U	OSCILLOSCOPE
415TS-569/FT	TRANS MEAS SET

T-642/GRN	RADIO BEACON XMTR	092959	TMII-5825-202-95
AN/GRN-6 T-642/GRN	190-500KC AM MCW		
213AN/URN-105	212 25 V 3 KV	AC	
214AN/URN-105	211 25 V 25 KV	DC	
215AN/URN-105	271 75 0 51 MO	DC	
143 1KC	INPUT FREQ AUDIO TEST		
221 100MA-3A	OUTPUT CUR DC		
235 400W	OUTPUT POWER		
245 350KC	OUTPUT FREQ RF		
260 6SFC-25SFC	OUTPUT TIME MEASURE		
201TS-382E/U	AUDIO OSCILLATOR	TROUBLE SHOOTING	
202AN/URN-105	MULTIMETER	TROUBLE SHOOTING	
203TS-723/U	SPECTRUM ANALYZER	TROUBLE SHOOTING	
204AN/URM-79	FREQUENCY METER	TROUBLE SHOOTING	
205OS-8C/U	OSCILLOSCOPE	TROUBLE SHOOTING	
206ME-30B/U	VTVM	TROUBLE SHOOTING	
207TV-7/U	TUBE TESTER	TROUBLE SHOOTING	
208TV-2/U	TUBE TESTER	TROUBLE SHOOTING	
210DA-75/U	DUMMY LOAD	TROUBLE SHOOTING	
211MX-1472/U	MULTIMETER MULTIPLIER	TROUBLE SHOOTING	
212MX-1471/U	MULTIMETER SHUNT	TROUBLE SHOOTING	

AN/GRA-6	CONTROL GROUP	041851	TM11-5038
1C-434/GRC	LOCAL CONTROL		
2H-33/PT	HANDSET		
3C-433/GRC	REMOTE CONTROL		
101BA-414/U	111 15 V 45 V	45VDC/3VDC BY BATTERIES	
102AN/GRA-6	112 100 V125 V	20C RING FREQ	
201TS-505/U	VTVM		

CV-2/TX	CONVERTER	61945	TMII-4021
CV-2/TX 1800-3000C	AM TO FM		
101	112 100 V130 V10	PRIMARY POWER	
102	192 45 W 55 W10		
143 1.8KC-100KC	INPUT FREQ AUDIO TEST		
210	211 25 V255 V10		
211	212 64 V220 V10		
212	271 1 0950 K010		

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201	OSCILLOSCOPE	
202	BEAT FREQ OSC. 1-4KC	50MW AT 500 OHM IMPEDANCE
203	MULTIMETER	
204RC-120-R	FACSIMILE SFT	
206	AC VTVM	
207	DC VTVM	
209	SIGNAL GENERATOR	100KC RANGE

TA-182/U	SIGNAL CONVERTER	40252	TMII-2137
101	112 115 V 10	50/60 CPS, 40W TO XMR PRIMARY	
204TS-352/U	211 3 V350 V	APPLY 1325 CPS EXT SIG	
205TS-352/U	212 1 V355 V	APPLY 1325 CPS EXT SIG	
203TS-352/U	271 037 0 234 MO	APPLY 1325 CPS EXT SIG	
112 6.3V-570V	INPUT VOLT AC		
243 1225C-1600C	OUTPUT FREQ AUDIO TEST		
301FR-67/U	FREQUENCY METER		
302HEADPHONE	HEADPHONE		
303TS-460/U	IMPEDANCE BRIDGE		
304TA-182/U	STD CONVERTER		
305TELEPHONE SFT	TELEPHONE SFT	2 REQ	
306TS-352/U	MULTIMETER		

AN/PRS-3	DETECTOR SFT	11457	TMII-4074
AN/PRS-3 1000C	PHASE DETECTION		
101BATTERY	111 135 V		
102BATTERY	111 15 V		
200TS-505/U	211 1 V110 V10		
208MF-30A/U	243 003 V 60 V10		
210TS-505/U	271 2 0 54 MO10		
143 1KC-2KC	INPUT FREQ AUDIO		
213 3MV-75V	OUTPUT VOLT AUDIO TEST		
243 3MV-60V	OUTPUT FREQ AUDIO		
201TS-382/U	AUDIO OSCILLATOR		
202TS-505/U	VTVM		
203TS-352/U	MULTIMETER		
204TV-7/U	TUBE TESTER		
205ME-30A/U	AC VOLTMETER		
206OS-8A/U	OSCILLOSCOPE		
207BATTERY	9VOLT OR 13VOLT		

R-395/PRD-1	RADIO RECEIVER DF	100755	TMII-677
AN/PRD-1 R-395/PRD-1	100KC-30MC AM FM CW 1CW		
101DY-79/PRD-1	24 V		
102CY-947/PRD-1			
210TS-352/U	211 15 V 90 V10		
211TS-352/U	271 3 0 12 MO10		
111 1.3V-87V	INPUT VOLT DC		
			DYNAMOTOR 7AMP INPUT
			ALTERNATE BATTERY SUPPLY
			TROUBLESHOOTING
			TROUBLESHOOTING

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143 200C-3.5KC	INPUT FREQ AUDIO TEST	
152 3KC-95KC	INPUT MOD AC	
114 300UV-3V	INPUT VOLTS IF TEST	
155 50V-200V	INPUT MOD RF	
155 100KC-20MC	INPUT MOD RF	
244 455KC+1610KC 3 IF		
201AN/URM-25A	SIGNAL GENERATOR	TROUBLESHOOTING
202TS-352/U	MULTIMETER	TROUBLESHOOTING
203TS-505/U	VTVM	TROUBLESHOOTING
204OS-8A/U	OSCILLOSCOPE	TROUBLESHOOTING
205TS-382/U	AUDIO OSCILLATOR	TROUBLESHOOTING
206TV-7/U	TUBE TESTER	TROUBLESHOOTING
207ZM-3/U	ANALYZER	TROUBLESHOOTING
208AN/URM-79	FREQUENCY METER	TROUBLESHOOTING
209AN/URM-80	FREQUENCY METER	TROUBLESHOOTING

AN/TRD-10	DIRECTION FINDER SET	070054
AN/TRD-10 R-220/URR	20-230MC AM FM CW	
101	112 115 V 10	60 CPS
102	132 500 W 10	60 CPS
207TS-352/U	271 1 0 3 MO10	
208TS-352/U	211 3 V 21 KV10	
209TS-352/U	212 315 V480 V10	
215 30V-1MV	OUTPUT VOLT RF	
242 72KC-146KC	OUTPUT FREQ OSCILLATORS	
244 6.0942-48.7535+1.75MC+455KC 3 IF		
245 20MC-160MC	OUTPUT FREQ RF	
2011-177	TUBE TESTER	
202TS-352/U	MULTIMETER	
203TS-505/U	ELECTRONIC MULTIMETER	
2041-72	SIGNAL GENERATOR	
205RC-1060-A	OSCILLOSCOPE	
305SCR-211	FREQ METER	

TT-1/TXC-1	FACSIMILE TRANSCIVER	042356	TM11-2258
AN/TXC-1 1800C BAND	LIMITS 900-2700C AM		
109PP-86/TXC-1	POWER SUPPLY		
110TT-1/TXC-1	112 115 V	60CPS	3A
211TS-352/U	271 1 0 32 MO		
212TS-352/U	211 15 V650 V	1000 OHMS PER VOLT	
213TS-352/U	211 25 V520 V	20K OHMS PER VOLT	
113 6V	INPUT VOLT AUDIO		
121 270MA	INPUT CUR DC		
122 500MA-6.25A	INPUT CUR AC		
123 2.74A	INPUT CUR AUDIO		
213 60MV-1KV	OUTPUT VOLT AUD		
221 28MA-33MA	OUTPUT CUR DC		
250 96 SCANNING LINES/INCH			
201TS-140/PCM	TEST SFT	TM11-2096	
202SG-15/PCM	SIGNAL GEN	TM11-2096	

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203ME-22/PCM	DECIBEL METER	TM11-2096
204TS-352/U	MULTIMETER	
205OS-8A/U	OSCILLOSCOPE	
206ME-6A/U	ELECTRONIC MULTIMETER	
207TV-2/U	TUBE TESTER	
208HS-30	HEADSET	

AN/UIC-1	INTERCOMMUNICATION SET	31651	TM11-2643
AN/UIC-1 AM-65/GRC 400-2500C			
101	111 12 V 24 V10		
102	121 24 A 385 A10		
2031-166	212 150 V 10		
2041-166	211 6 V135 V10		
2051-166	271 10 0470 K010		PLUS WIRING CONTINUITY
111 6V-135V	INPUT VOLT DC		
121 35MA-6.1A	INPUT CUR DC		
212 150V	OUTPUT VOLT AC		
213 5V	OUTPUT VOLT AUDIO		
243 400C-5KC	OUTPUT FREQ AUDIO		
2011-177	TUBE TESTER		
2021-166	VOLTOHMMETER		

AM-65/GRC	AF AMPLIFIER	010451	TM11-5039
101	111 6 V		
102	121 61 A		AT 6V VIBRATOR SUPPLY
103	111 12 V		
204TS-505/U	211 15 V135 V 5		
206TS-505/U	271 16 0470 K010		
201TS-505/U	VTVM		
202ME-6/U	VTVM		
203TS-382A/U	AUDIO OSCILLATOR		

AN/VIA-4	INTERCOM STATION	040357	TM11-706
102	111 24 V		
202TS-352/U	211 35 V 24 V		
203TS-352/U	271 150 0 18 K010		
111 3.5V-24V	INPUT VOLT DC		
201TS-352/U	MULTIMETER		

TH-5/TG	TELEGRAPH TERMINAL	50-60 CPS	TM11-2239
101	112 115 V 10		
102	142 60 W		
203TS-352/U	211 124 V285 V10		
204TS-352/U	212 13 V355 V10		

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205TS-352/U	271	20	0	33	MO 5	
112 90V-115V					INPUT VOLT AC	
132 60W					INPUT PWR AC	
212 500MV-355V					OUTPUT VOLT AC	
213 300MV-1.3V					OUTPUT VOLT AUDIO	
221 9MA-20MA					OUTPUT CUR DC	
243 1225C-1325C					OUTPUT FREQ AUDIO	
2011-177					TUBE TESTER	
202TS-352/U					MULTIMETER	
301FR-67/U					FREQUENCY METER	
302TS-370/U					AUDIO OSCILLATOR	OR SG-15/PCM
303TS-352/U					MULTIMETER	USE AS MILLIAMMETER
3041-193-C					TEST SET	OR TELTYPEWRITER
305TH-5/TG					TELEGRAPH TERMINAL	SPARE USED FOR TEST
306TS-611/FG					TT DISTORTION TEST SET	
307RECTIFIER					130 V SOURCE	
308HEADSET					STANDARD HEADSET	
309TS-460/U					IMPEDANCE BRIDGE	

PP-109/GR		POWER SUPPLY		120054	TM-11-5036
101	111	126	V	10	
102	121	115	A	10	
209TS-505/U	271	35	0 1	MO10	
210TS-505/U	211	5	V485	V10	
111 12.6V			INPUT VOLT DC		
121 11.5A			INPUT CUR DC		
212 5V			OUTPUT VOLT AC		
201TS-352/U			MULTIMETER		
202TV-7/U			ELECTRON TUBE SET		
203TS-505/U			ELECTRONIC MULTIMETER		
2041F-9-C			TEST EQUIPMENT		
2051-177			TUBE TESTER		
206TV-7/U			TUBE TESTER		
207MF-6A/U			VTVM		
2081-50			VOLTAMMETER		

PP-281/GRC		POWER SUPPLY		112950	TM11-5040
101	111	126	V	10	
102	121	225	A	10	
208TS-505/U	211	124	V 128	V10	SUPPLY INPUT
209TS-505/U	271	1	0 1	MO10	
210TS-352/U	221	19	A 24	A10	WITH 1150 OHM LOAD
211TS-505/U	211	130	V155	V10	SUPPLY OUTPUT
111 12.6V			INPUT VOLT DC		
121 2.25A			INPUT CUR DC		
212 67.5MV			OUTPUT VOLT AC		
221 1.9A			OUTPUT CUR DC		
201MF-6/U			AC VOLTMETER		
202TS-505/U			ELECTRONIC MULTIMETER		
203TS-352/U			MULTIMETER		

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204DUMMY LOAD
207CX-1331/U

1150 OHMS 22 WATTS
TEST LEAD SET

PP-282/GRC

POWER SUPPLY

112950

TM11-5040

101	111	252	V	10
102	121	123	A	10
208TS-505/U	211	248	V 256	V10
209TS-505/U	271	1	O	MO10
210TS-352/U	221	1	A 13	A10
111 6.3V-25.2V			INPUT VOLT DC	
121 1.23A-4.1A			INPUT CUR DC	
212 67.5MV			OUTPUT VOLT AC	
221 1A-4.6A			OUTPUT CUR DC	
201MF-6/U			AC VOLTMETER	
202TS-505/U			ELECTRONIC MULTIMETER	
203TS-352/U			MULTIMETER	
204DUMMY LOAD			1150 OHMS 22 WATTS	
205RESISTOR			5100 OHMS 1 WATT	
206CAPACITOR			2 UF 600 VDC	
207CX-1331/U			TEST LEAD SET	

SUPPLY INPUT

WITH 1150 OHM LOAD

AN/FPN-33

RADAR SET

011558

TM11-1538

AN/FPN-33 9000-9160MC				
101	112	117	V	10
102	111	28	V	10
214TS-505/U	211	1	V 12	KV10
215TS-505/U	211	1	V800	V10
216TS-352B/U	212	10	MV155	V10
217TS-352B/U	271		50	MO10
111 28V			INPUT VOLT DC	
112 117V			INPUT VOLT AC	
212 10MV-155V			OUTPUT VOLT AC	
213 10V-50V			OUTPUT VOLT AUDIO	
243 22C-1500C			OUTPUT FREQ AUDIO	
267 3US-500MS			OUTPUT TIME PULSE	
201TS-488/UP			ECHO BOX	
202AN/USM-50			OSCILLOSCOPE	
203TS-148/UP			SPECTRUM ANALYZER	
204TS-352B/U			MULTIMETER	
205TS-147D/UP			TS-147	
206TS-505/U			VTVM	
207TS-268D/U			XTAL TEST SET	
208TV-7/U			ELECTRONIC TUBE TEST SET	
209SG-92/U			SWEEP GENERATOR	
210AN/UPM-15			PULSE GENERATOR	
211TS-382/U			AUDIO OSCILLATOR	
213AN/USM-32			SYNCHROSCOPE	

60 CPS

60 CPS

LESS THAN 1 OHM MINIMUM

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AN/MPQ-4A	RADAR SET	100259	TM11-5840-208-30
AN/MPQ-4A 16000 +OR- 160MC		3PHASE 400C YCONN 4 WIRE	
101PRIMARY POWER112 120	V		
215TS-352/U 211 2	V 135 KV10		
216TS-352/U 271 15	0100 KO10		
217TS-352/U 212 5	V800 V10		
111 27V-600V	INPUT VOLT DC		
112 120V	INPUT VOLT AC		
117 25V	INPUT VOLT PULSE		
144 30MC	INPUT FREQ IF		
212 5V-1KV	OUTPUT VOLT AC		
217 8V-35V	OUTPUT VOLT PULSE		
246 16KMC	OUTPUT FREQ MICROWAVE		
253 .25US PW PRF 8600PPS			
267 48US-76US	OUTPUT TIME PULSE		
201SG-299/U	SIGNAL GENERATOR		
202FR-67/U	FREQUENCY GENERATOR		
203TS-909/PPM	COMPUTER TEST SET		
204TV-7/U	TUBE TESTER		
205AN/UPM-60A	RADAR TEST SET		
206TS-505A/U	VTVM		
207AN/USM-50	OSCILLOSCOPE		
208TS-268E/U	XTAL RECT TEST SET		
209TS-352/U	MULTIMETER		
210TV-13/U	TUBE TESTER		
212AN/UPM-96	RADAR TEST SET		

AN/TPS-25	RADAR SET	050560	TM11-5840-217-35
AN/TPS-25 9375MC		AC 400C	
101PRIMARY POWER112 115	V		
226TS-352/U 211 290	V340 V10		
227TS-352/U 212 5	V 63 V10		
228TS-352/U 271 3 0 45	MO10		
111 6.3V-300V	INPUT VOLT DC		
112 115V	INPUT VOLT AC		
113 1KC	INPUT VOLT AUDIO		
116 9375MC	INPUT FREQ MICROWAVE		
117 10US	INPUT PULSE		
143 600C	INPUT FREQ AUDIO		
144 60MC	INPUT FREQ IF		
211 1.5V-450V	OUTPUT VOLT DC		
212 10MV-460V	OUTPUT VOLT AC		
214 4MC-62MC	OUTPUT FREQ IF TEST		
217 .5US	OUTPUT PULSE		
217 1850C PRF	OUTPUT PRF		
246 9375MC	OUTPUT FREQ		
201TS-352/U	MULTIMETER		
202TS-340/U	VOLTMETER PRECISION		
203TS-505/U	VTVM		
204TV-7/U	TUBE TESTER		
205TV-2/U	TUBE TESTER		
206TS-382A/U	AUDIO OSCILLATOR		

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207TS-452R/U	SIGNAL GENERATOR
208TS-147B/UP	X BAND TEST SET
209AN/USM-50	OSCILLOSCOPE
210TS-148/UP	SPECTRUM ANALYZER
211AN/UPM-11A	RANGE CALIBRATOR
214DA-148/U	DUMMY LOAD WAVEGUIDE
215TS-497A/URR	SIGNAL GENERATOR
216AN/UPM-15	PULSE GENERATOR
217AN/USM-26	PULSE COUNTER
218SG-337/U	NOISE GENERATOR
219PD-2234/U	NOISE GENERATOR PWR SPT
220ZM-4B/U	WHEATSTONE BRIDGE
221CN-533/U	VARIABLE ATTENUATOR
222CN-537/U	FIXED ATTENUATOR
223AN/URM-52A	SIGNAL GENERATOR
224IM-97/USM-37	STANDING WAVE INDICATOR
225MX-2569/U	RF DETECTOR

IM-156/PD	RADIACMETER	TMI-6665-207-35
101BATTERY	111 90 V	POWER REQUIREMENTS
102BATTERY	111 135 V	POWER REQUIREMENTS
103BATTERY	111 65 V	2 REQUIRED
205MODEL 600	271 14 KMO140 KMO10	A FUNCTION OF VOLTS-CURRENT
207TS-505A/U	211 1 V 90 V	APPROX
111 1.35V-90V	INPUT VOLT DC	
201TS-505A/U	VTVM	TROUBLE SHOOTING
202MODEL 600	ELECTROMETER	KEITHLEY CO.
203AN/URM-105	MULTIMETER	
204TV-6/U	TUBE TESTER	

IM-631PDR-27A	RADIACMETER	TMI-5543
101BA-416/U	111 135VOLTS	BATTERY
102BA-413/U	111 22.5VOLTS	BATTERY
103BA-401/U	111 1.5 VOLTS	BATTERY
204MULTIMETER	211 15 V700 V10	
203MULTIMETER	271 12 0 10 MO20	
111 1.5V-135V	INPUT VOLT DC	
2129 2V-48V	OUTPUT VOLT	
201MULTIMETER	20K OHMS PER VOLT	
202TS-341AP	OSCILLOSCOPE	

IM-93/UD	RADIACMETER	060657 TB SIG 226-7
101PP-630A/PD	DETECTOR CHARGER	ORIGINAL CHARGE
201IM-93/UD	24 H	MAX LEAK 3 ROENTGENS/DAY
301SPECIAL JIG	CHARGE TO ZERO	
302AN/UDM-1	CALIBRATOR SFT	

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R-108/GRC	RADIO RECEIVER	TM11-0898
R-108/GRC 109/GRC 110/GRC	20-55MC FM VOICE	OR TONE MOD
101PP-448/GR	111 POWER SUPPLY	6VOLT OR NEXT ITEM
102PP-281/GRC	111 POWER SUPPLY	12 VOLT OR NEXT ITEM
103PP-282/GRC	111 POWER SUPPLY	24 VOLT OR NEXT ITEM
104BATTERIES	111 130V AND 6.3V	IN LIEU OF POWER SUPPLIES
217TS-505/U	271 05 0 2MO	VARIOUS POINTS
219TS-505/U	211 1 V130 V10	VARIOUS POINTS
114 250UV-1V	INPUT VOLT IF TEST	
115 .75UV-30UV	INPUT VOLT RF TEST	
1432 400C-5KC	INPUT FREQ AUDIO FM TEST	
144 4.25MC-4.37MC	INPUT FREQ IF	
145 20MC-28MC	INPUT FREQ RF	
155 15KC	INPUT MOD RF TEST	
213 3V-173V	OUTPUT VOLT AUDIO	
234 4.3MC IF FREQ		
203TS-382/U	AUDIO OSCILLATOR	
204TS-505/U	ELECTRONIC MULTIMETER	
205AN/URM-79	FREQUENCY METER	
206SCR-211	FREQUENCY METER	
207AN/URM-80	FREQUENCY METER	
208TS-174R/U	FREQUENCY METER	
209AN/URM-48	SIGNAL GENERATOR	
210AN/URM-25	RF SIGNAL GENERATOR	
211TV-7/U	TUBE TESTER	
212TS-352/U	MULTIMETER	
216ME-6A/U	ELECTRONIC MULTIMETER	

R-109/GRC	RADIO RECEIVER	TM11-0898
101PP-448/GR	111 POWER SUPPLY	6VOLT OR NEXT ITEM
102PP-281/GRC	111 POWER SUPPLY	12 VOLT OR NEXT ITEM
103PP-282/GRC	111 POWER SUPPLY	24 VOLT OR NEXT ITEM
104BATTERIES	111 130V AND 6.3V	IN LIEU OF POWER SUPPLIES
106BATTERY	6V AT 3.5 AMPERES	OR NEXT ITEM
107BATTERY	12V AT 2 AMPERES	OR NEXT ITEM
108BATTERY	24V AT 1.5 AMPERES	
217TS-505/U	271 05 0 2MO	VARIOUS POINTS
219TS-505/U	211 1 V130 V10	VARIOUS POINTS
114 250UV-1V	INPUT VOLT IF TEST	
115 .75UV-30UV	INPUT VOLT RF TEST	
1432 400C-5KC	INPUT FREQ AUDIO FM TEST	
144 4.25MC-4.37MC	INPUT FREQ IF TEST	
145 20MC-39MC	INPUT FREQ RF	
1552 15KC	INPUT MOD RF FM TEST	
213 3V-173V	OUTPUT VOLT AUDIO	
203TS-382/U	AUDIO OSCILLATOR	
204TS-505/U	ELECTRONIC MULTIMETER	
205AN/URM-79	FREQUENCY METER	
206SCR-211	FREQUENCY METER	
207AN/URM-80	FREQUENCY METER	

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208TS-174R/U	FREQUENCY METER
209AN/URM-48	SIGNAL GENERATOR
210AN/URM-25	RF SIGNAL GENERATOR
211TV-7/U	TUBE TESTER
212TS-352/U	MULTIMETER
216ME-6A/U	ELECTRONIC MULTIMETER

R-110/GRC	RADIO RECEIVER	TM11-0898
101PP-448/GR	111 POWER SUPPLY	6VOLT OR NEXT ITEM
102PP-281/GRC	111 POWER SUPPLY	12 VOLT OR NEXT ITEM
103PP-282/GRC	111 POWER SUPPLY	24 VOLT OR NEXT ITEM
104BATTERIES	111 130V AND 6.3V	IN LIEU OF POWER SUPPLIES
106BATTERY	6V AT 3.5 AMPERES	OR NEXT ITEM
107BATTERY	12V AT 2 AMPERES	OR NEXT ITEM
108BATTERY	24V AT 1.5 AMPERES	
217TS-505/U	271 050 0 2MO	VARIOUS POINTS
219TS-505/U	211 1 V130 V10	VARIOUS POINTS
114 250UV-1V	INPUT VOLT IF TEST	
115 1.5UV-30UV	INPUT VOLT RF TEST	
1432 400C-5KC	INPUT FREQ AUDIO FM TEST	
144 4.27-4.37MC	INPUT FREQ IF TEST	
145 20MC-55MC	INPUT FREQ RF	
1552 15KC	INPUT MOD RF FM TEST	
213 3V-173V	OUTPUT VOLT AUDIO	
203TS-382/U	AUDIO OSCILLATOR	
204TS-505/U	ELECTRONIC MULTIMETER	
205AN/URM-79	FREQUENCY METER	
206SCR-211	FREQUENCY METER	
207AN/URM-80	FREQUENCY METER	
208TS-174R/U	FREQUENCY METER	
209AN/URM-48	SIGNAL GENERATOR	
210AN/URM-25	RF SIGNAL GENERATOR	
211TV-7/U	TUBE TESTER	
212TS-352/U	MULTIMETER	
216ME-6A/U	ELECTRONIC MULTIMETER	

RT-178/ARC-27	RECEIVER-TRANSMITTER	12860	TM11-5821-225-24
AN/ARC-27 RT-178/ARC-27	225-400MC AM VOICE		
101PRIMARY POWER	111 275 V	25.5AMPS MAX	
213TS-375/U	211 1 V440 V10		
214TS-375/U	271 1 14 MO10		
113 .5V	INPUT VOLT AUDIO TEST		
114 1UV-20UV	INPUT VOLT IF TEST		
115 5UV-1MV	INPUT VOLT RF TEST		
144 3.45MC-20MC	INPUT FREQ IF TEST		
145 350MC	INPUT FREQ RF		
214 85KC-29.9MC	OUTPUT FREQ IF TEST		
233 250MW-500MW	OUTPUT POWER AUDIO		
234 20-30MC+4.8-5.7MC+3.45MC	3 IF		
235 9W	OUTPUT POWER RF		

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244 3.45MC-21.2MC	OUTPUT FREQ IF TEST	
201608-A	SIGNAL GENERATOR	
202AN/URM-25C	SIGNAL GENERATOR	
203TS-80/U	TEST METER	
204FR-4/U	FREQUENCY METER	
2051-177	TUBE TESTER	MX-949/U ADAPTOR
20643	WATTMETER	ELEMENT D-25 AND D-50
207TS-375/U	VTVM	
208MF-11/U	WATTMETER	
209TS-382A/U	AUDIO OSCILLATOR	
2100S-8/U	OSCILLOSCOPE	
211TS-297/U	OUTPUT METER	
212325B	NOISE AND DISTORTION	

T-195/GRC-19	RADIO TRANSMITTER	TM11-0806
T-195/GRC-19 1500KC-20MC CW VOICE FREQ SHIFT KEY		
101	111 22 V 30	V9999928.5 FOR BEST RESULTS =.5VRF
102	121 42 A	250A FOR .55SECOND INTERVALS
103	121 9 A	
205TS-352/U	271 5 0 20 MO10	KEY CKT SHORT LOCATING
215TS-505/U	211 3 V175 V10	
216TS-505/U	211 80 V250 V10	
115 1UV-70UV	INPUT VOLT RF TEST	
121 9A-42A	INPUT CUR DC	
125 1.414A	INPUT CUR RF TEST	
143 300C-10KC	INPUT FREQ AUDIO	
144 130UV-70MV 45KC	INPUT VOLT IF TEST	
145 .5MC-31.90MC	INPUT FREQ RF TEST	
211 .4V-250V	OUTPUT VOLT DC	
235 80-100W	OUTPUT POWER RF	
158TV-7/U	TUBE TESTER	
201TS-352/U	MULTIMETER	
202TS-505/U	ELECTRONIC MULTIMETER	
301TS-382/U	AUDIO OSCILLATOR	
3030S-8A/U	OSCILLOSCOPE	
4011S-76	RF AMMETER	
404STOP WATCH		60 SECOND
4053F1200-4	AMMETER	
408TS-723/U	SPECTRUM ANALYZER	

AN/GRR-5	RADIO RECEIVING SET	080852	TM11-295
AN/GRR-5 1500KC-18MC AM CW MCW			
102PP-308/URR	112 115 V	50-60C 455MA 52.4 WATT	
103	111 6 V	6.9A 41.4W	
104	111 12 V	3.22A 38.6W	
105	111 24 V	2.55A 61.2W	
106	111 90 V	27MA	
208TS-505/U	271 2 0 45 MO10		
209TS-505/U	211 1 V205 V10		
210TS-505/U	212 63 V380 V10		

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115 5UV	INPUT RF TEST
145 250C-18.91MC	INPUT FREQ RF TEST
244 455KC IF	
213 10MW	OUTPUT POWER AUDIO
201AN/URM-25	RF SIGNAL GENERATOR
202TS-588/U	SIGNAL GENERATOR
203TS-585A/U	OUTPUT METER
204SCR-211	FREQUENCY METER
205TS-505/U	VTVM
206I-177	TUNE TESTER
207TS-382A/U	AUDIO OSCILLATOR

AN/PRC-8	RADIO SET					TM11-4065
AN/PRC-8,9,10	20-54.9MC	FM	VOICE	RT-174/PRC		
101BA-279/U	111	15	V		BATTERY	SEE NEXT ITEM
102BA-279/U	111	6	V		BATTERY	SEE NEXT ITEM
103BA-279/U	111	675	V		BATTERY	SEE NEXT ITEM
104BA-279/U	111	135	V		BATTERY	
211TS-352A/U	270	2	0	5	MO	
222TS-505/U	211	2	V		20	
226TS-183/U	211	135	V		10	
143 250C-5KC					INPUT FREQ AUDIO	
144 4.285-4.33MC					INPUT FREQ IF TEST	
145 20MC-28.6MC					INPUT FREQ RF	
213 85MV-775MV					OUTPUT VOLT AUDIO	
233 .03MW-7.5MW					OUTPUT POWER AUDIO	
235 1W-2W					OUTPUT POWER RF	
243 20MC-32.2MC					OUTPUT FREQ TEST	
244 4.3MC IF						
2552 15KC DEV.						
201TS-382/U					AUDIO OSC	TM11-2684A
202AN/URM-48					RF SIG GEN	TM11-1257
203I-208					IF SIG GEN	TM11-317
204TS-352A/U					MULTIMETER	TM11-5527
205TS-505/U					VTVM	TM11-5511
206TS-585A/U					OUTPUT METER	TM11-5017
207ME-11/U					RF WATTMETER	
208TS-174B/U					FREQ METER	TM11-5044
209TS-183/U					BATTERY TESTER	TM11-2571
210TV-7/U					TUNE TESTER	

AN/PRC-9	RADIO SET					TM11-4065
AN/PRC-9A,10A	27-55MC	FM	VOICE	RT-175/PRC		
101BA-279/U	111	15	V		BATTERY	SEE NEXT
102BA-279/U	111	6	V		BATTERY	SEE NEXT
103BA-279/U	111	675	V		BATTERY	SEE NEXT
104BA-279/U	111	135	V		BATTERY	SEE NEXT
105AM-598/U	111				ALTERNATE POWER SUPPLY	
211TS-352A/U	270	2	0	5	MO	

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222TS-505/U	211	2	V	20	
226TS-183/U	211	135	V	10	
143 250C-25KC			INPUT FREQ AUDIO		
144 4.27MC-4.93MC			INPUT FREQ IF TEST		
145 28MC-38.7MC			INPUT FREQ RF		
213 85-775MV			OUTPUT VOLT AUDIO		
233 .03MW-25MW			OUTPUT POWER AUDIO		
235 .8W-2W			OUTPUT POWER RF		
243 27MC-39MC			OUTPUT FREQ TEST		
245 28MC-43.3MC			OUTPUT FREQ RF		
2552 4KC-17KC			OUTPUT MOD RF TEST		
201TS-382/U			AUDIO OSC		TM11-2684A
202AN/URM-48			RF SIG GEN		TM11-1257
203I-208			IF SIG GEN		TM11-317
204TS-352A/U			MULTIMETER		TM11-5527
205TS-505/U			VTVM		TM11-5511
206TS-585A/U			OUTPUT METER		TM11-5017
207ME-11/U			RF WATTMETER		
208TS-174R/U			FREQ METER		TM11-5044
209TS-183/U			BATTERY TESTER		TM11-2571
210TV-7/U			TUBE TESTER		

AN/PRC-10			RADIO SFT			TM11-4065
101BA-279/U	111	15	V			BATTERY SEE NEXT
102BA-279/U	111	6	V			BATTERY SEE NEXT
103BA-279/U	111	675	V			BATTERY SEE NEXT
104BA-279/U	111	135	V			BATTERY
211TS-352A/U	270	2	O	5	MO	VARIOUS POINTS
216TS-505/U	211	3	V		10	
226TS-183/U	211	135	V		10	
143 250C-2.5KC			INPUT FREQ AUDIO			
144 4.27MC-4.93MC			INPUT FREQ IF TEST			
145 38MC-54.5MC			INPUT FREQ RF			
213 85MV-775MV			OUTPUT VOLT AUDIO			
233 .03MW-7.5MW			OUTPUT POWER AUDIO			
234 1W-2W			OUTPUT POWER TEST			
235 .8W-1.5W			OUTPUT POWER			
243 38MC-59.2MC			OUTPUT FREQ			
2552 4KC-17KC			OUTPUT MOD RF FM TEST			
201TS-382/U			AUDIO OSC			TM11-2684A
202AN/URM-48			RF SIG GEN			TM11-1257
203I-208			IF SIG GEN			TM11-317
204TS-352A/U			MULTIMETER			TM11-5527
205TS-505/U			VTVM			TM11-5511
206TS-585A/U			OUTPUT METER			TM11-5017
207ME-11/U			RF WATTMETER			
208TS-174R/U			FREQ METER			TM11-5044
209TS-183/U			BATTERY TESTER			TM11-2571
210TV-7/U			TUBE TESTER			

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AN/PRC-10A	RADIO SFT			TM11-4065A
101RA-279/U	15	V		BATTERY
102RA-279/U	6	V		BATTERY
103RA-279/U	675	V		BATTERY
104RA-279/U	135	V		BATTERY
212TS-505/U	270	1	0 50 MO	
213TS-505/U	211	3	V135 V	
201TS-382A/U			AF OSC	
202TS-183/U			BATTERY TESTER	
203ME-6A/U			VTVM	
204TS-505/U			VTVM	
205TS-174R/U			FREQ METER	
206TS-352A/U			MULTIMETER	
207TS-585A/U			OUTPUT METER	
208MF-11/U			RF WATTMETER	
209AN/URM-48			RF OSC	
210AN/URM-25			IF OSC	
211P-173/U			PANORAMIC INDICATOR	

AN/URC-4	RADIO SFT	110156	TM11-510
AN/URC-4 RT-159/URC-4	120-260MC AM VOICE OR MCW		
101	111 125	V	
103	111 125	V	
201TS-352/U	211 125	V143 V10	
202TS-352/U	271 180	0270 K010	
203TS-352/U	211 6	V 50 V10	
121 45MA-520MA		INPUT CUR DC	
215 300UV-1MV		OUTPUT VOLT RF	
245 120MC-240MC		OUTPUT FREQ RF	
235 35MW		OUTPUT POWER RF	
204TS-352/U		MULTIMETER	
301TS-684/URM-30		ANALYZER	

TT-76/GGC	TELETYPEWRITER SFT		TM11-2225
101	112 115	V	50 TO 60 CPS 150W
202TS-297/U	271 1	0 25 KO	CONTINUITY TESTS
203TS-297/U	211 1	V120 V	VOLTAGE DROP MEASUREMENTS
201TS-297/U		MULTIMETER	
401TS-383/GG		DISTORTION TEST SET	ALTERNATE TS-2/TG

RT-77/GRC-9	RECEIVER TRANSMITTER	62056	TM11-0263
AN/GRC-9,9A,9X,9Y	RT-77/GRC-9 2-12MC AM CW	MCW PHONE	
113DY-88/GRC-9		DYNAMOTOR	6-12-24V BAT OPERATION
114DY-105/GRC-9X		DYNAMOTOR	24V ONLY IN LIEU DY-88/GRC-9
127BA-48		BATTERY PACK	FIELD OPERATION-AND RCVR TEST
128GN-58		GENERATOR	FIELD OPERATION-AND RCVR TEST
217TS-505/U	211 1	V580 V10	VARIOUS POINTS

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220TS-352/U	271	5	0220	K010
115 100V-500MV			INPUT VOLT RF	
1431 250C-3KC			INPUT FREQ AUDIO	
1441 455-465KC			INPUT FREQ IF TEST	
1451 2MC-12MC			INPUT FREQ RF TEST	
1551 30MC			INPUT FREQ RF TEST	
213 3MW-16MW			OUTPUT POWER AUDIO	
225 .1A-.78A			OUTPUT CUR RF	
244 456KC IF				
233 1MW-90MW			OUTPUT POWER AUDIO	
243 700C-1.1KC			OUTPUT FREQ AUDIO TEST	
245 11.2MC-12MC			OUTPUT FREQ RF	
235 1W-15W			OUTPUT POWER RF	
401FR-67/U			FREQ COUNTER	
4110S-8A/U			OSCILLISCOPE	
402AN/11RM-9			FREQ METER	
403MF-6A/U			AC VTVM	
406IS-7A			RF METER AMMETER	0-5 AMPERES
407TS-352/U			MULTIMETER	
408TS-382A/U			AF OSCILLATOR	
409TS-505/U			VTVM	
410AN/11RM-25			SIGNAL GENERATOR	

AN/GRC-46		RADIO TELETYPEWRITER SET	12060	TM11-5815-204-35
101BATTERY	111	275 V	VEHICLE TYPE	
AN/GRC-46 AN/VRC-29		J-668/GR 60 WORDS/MIN 22MS IMPULSES		
201TS-352R/U		MULTIMETER		
202TS-505/U		VTVM		
203TS-383/GG		DISTORTION TEST SET		
204PP-978/FG		POWER SUPPLY		
205TS-2/TG		KEYER		
206LOOP PWR SUPPLY		PWR SUPPLY	DC	
207TT-988/FG		TELETYPEWRITER		
401TS-383/GG		DISTORTION TEST SET		
405T-195/GRC-19		RADIO TRANSMITTER		
406R-392/UHR		RADIO RECEIVER	MONITOR	
407AN/GRC-46		TELETYPEWRITER SET	OTHER THAN ONE UNDER TEST	

J-668/GR		INTERCONNECTING BOX	12060	TM11-5815-204-35
100BATTERY	111	275 V	BATTERY-VEHICLE TYPE	
201TS-352R/U		MULTIMETER		
402TT-988/FG		TELETYPEWRITER		

AN/GRC-39		RADIO SET	111954	TM11-614
AN/GRC-10 T-235/GRC-10 R-125/GRC-10		54-71MC FM FONE KEY FAX		
101	112 117	V	60 CPS	
102	112 230	V	60 CPS	

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104	132 292	W	60CPS
105	131 326	W	
219TS-352/U	211 1	V550	V10
221TS-352/U	212 3	V280	V10
222TS-352/U	2	0 8	MO10
213 -50DB+14DB		OUTPUT AUDIO	
215 .1UV-100MV		OUTPUT VOLT RF	
243 125C-20KC		OUTPUT FREQ AUDIO	
244 15.15-16.05MC+4.3MC 2 IF			
245 3.2MC-70.0MC		OUTPUT FREQ RF	
201TS-352/U		MULTIMETER	
202TS-505/U		VTVM	
203MF-6A/U		VTVM	
204TV-2/U		TUNE TESTER	
205TV-7/U		TUBE TESTER	
206AN/URM-48		SIGNAL GENERATOR	HI FREQ 54 MC AND ABOVE
207TS-382/U		AUDIO OSCILLATOR	
208TS-118/AP		RF WATTMETER	
209IP-173/U		PANORAMIC INDICATOR	
210TS-585/U		OUTPUT METER	
211TS-723/U		SPECTRUM ANALYZER	
212SCR-211		FREQUENCY METER	LOW FREQ
213TS-174/U		FREQUENCY METER	HI FREQ
214FR-67/U		FREQUENCY METER	
215TS-579/U		FIELD STRENGTH METER	
216AN/URM-32		FREQUENCY METER	
218TS-497/URR		SIGNAL GENERATOR	LOW FREQ BELOW 54 MC

AN/TMO-5	RADIOSONDE RECORDER	30955	TM11-2436
AN/TMO-5,5A 1680MC AM			
101EXTERNAL PWR 112 105	V125	V	50 TO 65C 225 TO 275 W
204TS-352/U 211 5	V500	V	DC
203TS-352/U 212 05	V435	V	AC
205TS-352/U 271 12	0 40	MO	R
243 10-220CPS RECORDER			
201TS-352/U	MULTIMETER		
202TS-65C/FMQ-1	FREQUENCY STANDARD		
302OSCILLOSCOPE	OSCILLOSCOPE		
401TS-65C/FMQ-1	FREQUENCY STANDARD		

AN/GMD-1A	RAWIN SET	082054	TM11-271A
AN/GMD-1A 1660-1700MC AM OR FM			
101	112 115	V129	V
102	132 1	KW	
211TS-505/U 211 2	V300	V 5	
213TS-538A/U 212 5	V390	V10	
214TS-538A/U 271 12	0 26	MO10	
244 30MC IF			
201TS-249A/IIP	OSCILLOSCOPE DEPOT		
202TS-36A/AP	OSCILLOSCOPE FIELD		

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203TS-268/U	XTAL RECTIFIER TEST SET
204TS-505/U	VTVM
206TS-497/U	SIGNAL GENERATOR
207TV-7/U	TUBE TEST SET FIELD
208TV-2/U	TUBE TEST SET DEFECT
209TS-538A/U	TEST SET
210TS-297/U	MULTIMETER

RT-66/GRC	RECEIVER-TRANSMITTER	TM11-0289
RT-66/GRC 20-27.9MC	FM VOICE AND 1600C RING	
102STORAGE BATT 111	12 V	
104PP-109/GR	111 63 V	595MA
271TS-505/U	271 6 0 15 MO 4	
272TS-505/U	211 05 V 160	V99999VALUES SHOWN ARE TOL RANGE
273TS-505/U	211 15 V450 V 4	
113 3V-10V	INPUT VOLT AUDIO	
114 20UV-1V	INPUT VOLT IF TEST	
115 .3UV-10MV	INPUT VOLT RF TEST	
143 1KC	INPUT FREQ AUDIO	
144 1.4MC-5.35MC	INPUT FREQ IF TEST	
145 2MC-100MC	INPUT FREQ RF TEST	
1552 15KC	INPUT MOD RF FM TEST	
221 111A-1001A	OUTPUT CUR DC	
243 2W-16W	OUTPUT POWER RF	
244 4.45-5.45MC+1.4MC	2 IF	
245 3.05MC-27MC	OUTPUT FREQ RF	
201AN/URM-4R		SIGNAL GENERATOR
2805IMPSON 136		RF AMMETER 0-1 AMPS
440TS-352/U		MULTIMETER
450SIGC 3F871-10		MICROAMMETER
460TS-174/U		FREQUENCY METER
490TS-585/U		OUTPUT METER

101STORAGE BATT 111	12 V	AUTOMOTIVE TYPE
RT-67/GRC 27-38.9MC	FM VOICE AND 1600C RING	
102PP-109/GR	111 POWER SUPPLY	
222TS-505/U	271 5 0110 KO	APPROX
624TS-505/U	271 6 0 2 MO	VARIOUS POINTS
625TS-505/U	211 27 V450 V	-27 +450
113 3V-10V	INPUT VOLT AUDIO	
114 3.8UV-1V	INPUT VOLT IF TEST	
115 .3UV-10MV	INPUT VOLT RF TEST	
121 2MA-595MA	INPUT CUR DC	
143 1KC 15KC DEV	INPUT FREQ AUDIO	
144 1.355MC-5.45MC	INPUT FREQ IF TEST	
145 27MC-38.9MC	INPUT FREQ RF TEST	
1552 15KC	INPUT MOD RF FM TEST	
221 411A-1001A	OUTPUT CUR DC	
225 .5A	OUTPUT CUR RF	
245 3.04MC-3.96MC	OUTPUT FREQ RF	

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201TS-505/U	ELECTRONIC MULTIMETER	DC VOLT OHMMETER
202TS-297/U	MULTIMETER	
203ME-6A/U	ELECTRONIC MULTIMETER	AC VOLTMETER .001UF SHUNT
2043F871-19	MICROAMPERE METER	0 TO 100 UA
205TS-585A/U	OUTPUT METER	600 OHMS
206TV-2/U	TUBE TESTER	
207AN/URM-48	SIGNAL GENERATOR	
208AN/URM-25	FR SIGNAL GENERATOR	
209TS-382/U	AUDIO OSCILLATOR	
210TS-723/U	SPECTRUM ANALYZER	
211FR-67/U	FREQUENCY METER	
212MK-153/GRC	TEST FACILITIES KIT	
213TS-174/U	FREQUENCY METER	
214SCR-211	FREQUENCY METER SET	
215TS-174/U	HETERODYNE FREQ METER	

101STORAGE BAT	111	12	V		AUTOMOTIVE TYPE
102PP-109/GR	111	POWER	SUPPLY		
222TS-505/U	271	5	0110	KO	APPROX
624TS-505/U	271	6	0 2	MO	VARIOUS POINTS
625TS-505/U	211	27	V450	V	-27 +450

113 3V-10V	INPUT VOLT AUDIO	
114 200V-1V	INPUT VOLT IF TEST	
115 .50V-10MV	INPUT VOLT RF TEST	
121 2MA-595MA	INPUT CUR DC	
143 1KC 15KC DEFV	INPUT FREQ AUDIO	
144 1.37-5.45MC	INPUT FREQ IF TEST	
145 38MC-54.9MC	INPUT FREQ RF TEST	
1552 15KC	INPUT MOD RF FM TEST	
221 4UA-100UA	OUTPUT CUR DC	
225 .5A	OUTPUT CUR RF	
245 3.05-54MC	OUTPUT FREQ RF	
233 2W-16W	OUTPUT POWER RF	
201TS-505/U	ELECTRONIC MULTIMETER	DC VOLT OHMMETER
202TS-297/U	MULTIMETER	
203ME-6A/U	ELECTRONIC MULTIMETER	AC VOLTMETER .001UF SHUNT
2043F871-19	MICROAMPERE METER	0 TO 100 UA
205TS-585A/U	OUTPUT METER	600 OHMS
206TV-2/U	TUBE TESTER	
207AN/URM-48	SIGNAL GENERATOR	
208AN/URM-25	FR SIGNAL GENERATOR	
209TS-382/U	AUDIO OSCILLATOR	
210TS-723/U	SPECTRUM ANALYZER	
211FR-67/U	FREQUENCY METER	
212MK-153/GRC	TEST FACILITIES KIT	
213TS-174/U	FREQUENCY METER	
214SCR-211	FREQUENCY METER SET	
215TS-174/U	HETERODYNE FREQ METER	

RT-70/GRC

RECEIVER TRANSMITTER

TM11-0290

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RT-70/GRC 47-58.4MC	FM VOICE	
105PP-448/GR	VIBRATOR PWR SUPPLY	6 VOLT OR NEXT ITEM
106PP-281/GRC	VIBRATOR PWR SUPPLY	12 VOLT OR NEXT ITEM
107PP-282/GRC	VIBRATOR PWR SUPPLY	24V HOUSED IN AMP.AM-65/GRC
110BATTERY	6V VEHICULAR TYPE	OR NEXT ITEM
111BATTERY	12V VEHICULAR TYPE	OR NEXT ITEM
112BATTERY	24V VEHICULAR TYPE	
113 .25V-.45V	INPUT VOLT AUDIO	
114 12UV-2V	INPUT VOLT IF TEST	
115 .8UV-80UV	INPUT VOLT RF TEST	
121 28MA-415MA	INPUT CUR DC	
143 400C-5KC 15KDEV	INPUT FREQ AUDIO	
144 1.33-15MC	INPUT FREQ IF TEST	
145 47MC-58MC	INPUT FREQ RF TEST	
1542 15KC	INPUT MOD RF FM TEST	
213 .3V-50V	OUTPUT VOLT AUDIO	
221 .4MA-4MA	OUTPUT CUR DC	
225 90-100MA	OUTPUT CUR RF	
244 15MC+1.6MC 2 IF		
253 20KC DEV.		
235 500MW	OUTPUT POWER RF	
201TS-505/U	ELECTRONIC MULTIMETER	
202ME-6A/U	ELECTRONIC MULTIMETER	
203TS-352/U	MULTIMETER	
204TS-585/U	OUTPUT METER	
205TS-174/U	FREQUENCY METER	
206TV-7/U	TUBE TEST SET	
207AN/URM-48	SIGNAL GENERATOR	
208RT-70/GRC	RECEIVER TRANSMITTER	TM11-0290
209TS-588A/U	SIGNAL GENERATOR	
210TS-382A/U	AUDIO OSCILLATOR	

AN/GSA-7	RADIO SET CONTROL	50758	TM11-5135-15
AN/GSA-7 15-25C	RING ON WIRE.1600C RING ON RADIO		
101BATTERY	111 22 V 30 V		VEHICLE TYPE-OR AC LINE PWR
102	112 115 V 10		OR 230V 50-400CPS OR BAT.PWR
103	112 230 V 10		OR 115V 50-40CPS OR BAT.PWR
104	130 25 W		
212ME-77/U	271 5 0 44 MO10		
213ME-77/U	212 63 V230 V10		
214ME-77/U	211 1 V108 V10		
113 77.5MV-20W	INPUT VOLT AUDIO		
130 25W	INPUT POWER		
143 20C-1.6KC	INPUT FREQ AUDIO		
213 .1V-40V	OUTPUT VOLT AUDIO		
203SG-15/PCM	SIGNAL GENERATOR		
204FR-67/U	FREQUENCY METER		
205TV-2/U	TUBE TESTER		
206TS-382/U	AUDIO OSCILLATOR		
207TA-43/PT	FIELD TELEPHONE		
208ME-77/U	MULTIMETER		

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RC-289	REMOTE CONTROL SET	20653	TM11-2667
101	111 45 V 10		
102	111 15 V 10		
103	111 3 V 10		
2011-166	VOLTOHMMETER		
2021-166	271 30 0 15 KO10		
2031-166	211 3 V 15 V10		
405TS-352/U	MULTIMETER		
406TS-382A/U	AUDIO OSCILLATOR		

AN/TCC-11	TELEPHONE REPEATER	91653	TM11-2148
209TS-352/U	211 R2 V140 V SEPARATE		
210TS-352/U	271 178 0 316 0 SEPARATE		
113 2.5V	INPUT VOLT AUDIO		
143 1KC-6RKC	INPUT FREQ AUDIO TEST		
211 3.5MV-140V	OUTPUT VOLT DC		
212 25V-7.75V	OUTPUT VOLT AC		
201TS-712/TCC-11	TEST SET		
203TS-297/U	MULTIMETER		
204TV-2/U	TUNE TESTER		
205TS-402/U	ATTENUATOR		
206TS-352/U	MULTIMETER		
207SG-71	SIGNAL GENERATOR		
208MF-6/U	VTVM		
405MF-71/FCC	AUDIO LEVEL METER		

AN/TNS-3	SOUND RANGING SET	080156	TM11-2552A
AN/TNS-3 60-300C			
1RD-140/TNS	SOUND RECORDER		
6AN/PRC-10	RADIO SET		
101	111 56 V 63 V		PART OF AN/TNS-3
102	121 42 A		EQUIP REQ BUT NOT SUPPLIED
103	131 30 W 33 W		DYNAMOTOR INPUT
208TS-297/U	271 3 0 2 MO		DYNAMOTOR INPUT
209TS-297/U	211 2 V670 V		DYNAMOTOR INPUT
210TS-297/U	212 9 V150 V		
201TS-297/U	MULTIMETER		
204SCR-300-A	RADIO SET		
2051-151	OSCILLATOR		
206RC-1060	OSCILLOSCOPE		
207TS-505/U	ELECTRONIC MULTIMETER		ALT.VTVM TO BE 10 MO MIN IMP.

SR-22/PT	MANUAL SWITCHBOARD	110757	TM11-2202
SR-22/PT 20C RING, APPROX 5000C VOICE			
101	111 3 V		2 BATTERIES IN SERIES

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102	112	90	V100	V	RINGING GENERATOR FUNCTION
201TS-192/U		TEST SET			
202M-222		CONVERTER			
205TS-352/U	271	115	0 10	K0	CONTINUITY, RECTIFIER, T301
206TS-352/U	211	3	V		BATTERY SOURCE
207M-222	212	90	V100	V	EXT 20C SIG ACTIVATE INDICATC
401SG-15/PCM		SIGNAL GENERATOR			PART OF TS-140/PCM
402MF-22/PCM		DECIFL METER			PART OF TS-140/PCM
403TS-352/U		MULTIMETER			
4041-181		TEST SET			
406AN/PTM-6		TELEPHONE TEST SET			ALTERNATE FOR I-142
407TS-140/PCM		TEST SET			CONTAINS DB MTR AND SIG GEN

SR-86/P	TELEPHONE SWITCHBOARD	90955	TMII-4134
SR-86/P 20C RING, APPROX 2500C VOICE			
101	111	20	V 265 V10
102	111	15	V 265 V10
103	111	3	V 10
104	111	3	V 10
203TS-352/U	211	20	V 265 V10
204TS-352/U	271	82	0 51 K010
402I-142		COMPOSITE MEASURING INSTRUMENT	
403SG-15/PCM		SIGNAL GENERATOR	
404MF-22/PCM		DECIFL METER	
201TS-352/U		MULTIMETER	
202I-181		TEST SET	

TA-1/PT	TELEPHONE	100959	TMII-5805-243-35
101	111	96	V 63 V
102	121	42	A
103	131	30	W 33 W
203	271	60	0 47 K010
204	212	65	V 80 V10
401TS-352/U	211	65	V 80 V10
201TS-297/U		MULTIMETER	
202I-142		TEST SET	

TA-312/PT	TELEPHONE SET	122757	TMII-2155
101TA-312/PT	111	3	V
203TS-352/U	271	85	0 41 K010
302TS-352/U	211	38	V 46 V
201TS-352/U		MULTIMETER	
202AN/PTM-6		TEST SET	
		BATT INTERNAL OR EXTERNAL	
		TROUBLE SHOOTING	
		BUZZER MIN VOLTAGE	
		TROUBLE SHOOTING	
		TROUBLE SHOOTING	

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AN/PGC-1	TELETYPEWRITER SET	82459	TMII-5815-206-15
101	112 105 V125 V10	50 TO 60 CPS OR DC	
102	111 105 V125 V10		
205TS-297/U	211 105 V125 V10		
206TS-297/U	212 105 V125 V10		
207TS-297/U	271 90 0360 010		
4012M-21/U	271 8 MO	MINIMUM INSULATION RESISTANCE	
201TS-297/U	MULTIMETER		
2022M-21/U	OHMMETER		
204TS-383/GC	DISTORTION TEST SET		

AN/TCC-7	TELEPHONE TERMINAL	TM11-2139
101	112 1035 V1265 V	49 TO 65 CYCLES
102	112 207 V253 V	49 TO 65 CYCLES
103	192 790 W	
209ME-6/U	211 25 V 1150 KV 5	
211TS-352/U	212 36 V 1 KV10	MULTIMETER
212TS-352/U	271 036 0 3 MO10	
213 15MV-7.75V	OUTPUT VOLT AUDIO	
243 1KC-194KC	OUTPUT FREQ AUDIO	
273 0DB-70DB	OUTPUT LEVELS	
201TS-402/U	ATTENUATOR	
2022M-3/U	ANALYZER	
203MF-6/U	VTVM	
204FR-67/U	FREQ METER	
205SG-15/PCM	SIG GEN	
206SG-71/FCC	SIG GEN	
207ME-71/FCC	AUDIO LEVEL METER	

2081-177	TUBE TESTER	072760	TMII-5895-217-15
RT-494/APX-44	RADAR RCVR-XMTR		
AN/APX-44 RT-494/APX-44	1030MC RCVR, 1090MC XMTR		
204AN/URM-105	212 6 V115 V10	TROUBLE SHOOTING	
205AN/URM-105	271 1 0 225 MO10	TROUBLE SHOOTING	
206TS-505/U	211 1 V260 V 10	TROUBLE SHOOTING	
325240A	144 35 MC 75 MC	SWEEP RATE 60CPS	
327AN/USM-81	2409 6 MC 10	APPROX	
330240A	145 1027KMC 1033KMC	BW 6 TO 8 MC AT 3DB	
331N410A	216 1090KMC	BW 6 TO 8 MC AT 3DB	
334612	1539 1030KMC	A/C ADJUSTMENT 50 PERCENT	
335AN/USM-81	500 C 1 KC	PULSE RATE	
336180A	1539 1 US 10	1 MICROSECOND PULSE	
341AN/USM-81	2529 35 US 55 US	PULSE WIDTH	
345612	146 1030KMC	SIG INPUT -76DBM	
244 60MC IF			
2429 2US-9US	OUTPUT PULSE TEST		
2529 1US-120US	OUTPUT PULSE TEST		
401612A	SIGNAL GENERATOR	FINAL TEST	
402180A	MARKER GENERATOR	FINAL TEST	
403650B	POWER BRIDGE	FINAL TEST	

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404612A	DETECTOR	FINAL TEST
4053002-20	DIRECTIONAL COUPLER	FINAL TEST
406N410A	WAVEMETER	FINAL TEST
407756A-10	ATTENUATOR	FINAL TEST
408805	SLOTTED LINE	FINAL TEST
409415R	STANDING WAVE IND	FINAL TEST
410AN/USM-81	OSCILLOSCOPE	FINAL TEST
419650B	232 251 W 1 KW	PEAK PWR REQUIRES FORMULA
307AN/USM-108	ELECTRONIC MARKER	HEWLETT-PACKARD
309631-D	BOLOMETER	PRD
310628-A	BOLOMETER	PRD
318AN/UPM-15	PULSE GENERATOR	HEWLETT-PACKARD
319TV-2/U	TUBE TESTER	HEWLETT-PACKARD
320TV-7/U	TUBE TESTER	HEWLETT-PACKARD
321TS-268/U	XTAL RECT TESTER	HEWLETT-PACKARD
322TS-1100/U	TRANSISTOR TESTER	HEWLETT-PACKARD
323AN/UPM-98	RADAR TESTER	HEWLETT-PACKARD

R-445/ARN-30	RADIO RECEIVER	52559	TM11-5826-207-24
R-445/ARN-30			
101DY-86/ARN-30	111 275 V		DYNAMOTOR 1.7 AMPS
207TS-352/U	211 05 V270 V10		
208TS-352/U	271 4 0 25 MO10		
143 30C-10KC	INPUT FREQ AUDIO		
145 8UV-10MV	INPUT VOLT RF		
213 .7V-12V	OUTPUT VOLT AUDIO		
401TS-352/U	MULTIMETER		
402SG-66ARM-5	SIGNAL GENERATOR		
403ME-6B/U	VTVM		
404202-B	FM SIG GENERATOR		
4051-50	VOLTMETER		
406TS-11/AP	MILLIAMETER		

CV-265/ARN30A	SIGNAL DATA CONVERTER	52959	TM11-5826-207-24
101	28 V	450MA FILAMENT	
205TS-352/U	211 7 V240 V	DC	
206TS-352/U	271 55 0 2 MO		
207ME-6B/U	212 01 V 45 V	AC	
4011-50	VOLTMETER		
402TS-352/U	MULTIMETER		
403ME-6B/U	VTVM		
404SG-66/ARM-5	SIG GENERATOR		

AN/ARN-59	DIRECTION FINDER SET	091258	TM11-5826-204-95
AN/ARN-59 .19-1.75MC			
101	111 275 V -10		
107	121 28 A 10		

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214AN/URM-105	211	1	V125	V10
215AN/URM-105	271	12	O 14	MO25
244 142.5 IF				
215 10UV-1MV			OUTPUT VOLT RF	
245 200KC-1.7MC			OUTPUT FREQ RF TEST	
201AN/URM-105			MULTIMETER	
202TV-2/U			TUBE TESTER	
203ME-26A/U			VTVM	
204AN/URM-25F			SIGNAL GENERATOR	
205TS-382A/U			AUDIO OSCILLATOR	
206MX-1471/U			INSTR SHUNT	
207TS-723A/U			SPECTRUM ANALYZER	
208AN/ARM-42			RADIO TEST SET	
209TS-585/U			OUTPUT METER	
210AN/URM-32			FREQUENCY METER	
211STOP WATCH				
212TS-352/U			MULTIMETER	

AN/ARC-44	RADIO SET	120456	TM11-517
AN/ARC-44 RT-294/ARC-44 24-51.9MC FM VOICE			
101	111 275 V 10		
102	121 3 A 47 A10		
213TS-505/U	211 1 V320 V10		
214ME-30A/U	212 01 V100 V10		
215TS-505/U	271 1 O 23 MO		
215 1UV-20MV	OUTPUT VOLT RF TEST		
244 6.55-7.45MC+2.9875MC 2 IF			
245 3MC-55MC	OUTPUT FREQ RF		
201AN/URM-48	SIGNAL GENERATOR		
202AN/ARM-8	TEST SET		
203TS-382A/U	AUDIO OSCILLATOR		
204TV-2/U	TUBE CHECKER		
205TV-7/U	TUBE CHECKER		
206TS-505/U	VTVM		
207ME-30A/U	VTVM		
208AN/PRM-10	GRID DIP METER		
209TS-723/U	MULTIMETER		
210AN/URM-43	WATTMETER		
211AN/URM-80	FREQ METER		
212AN/URM-79	FREQ METER		

R-746/AR	RADIO RECEIVER	051359	TM11-5826-200-35
R-746/AR 329.3-335MC AM VOICE			
205VTVM	271 2 KO 1 MO		LESS THAN 1 OHM
206VTVM	221 2 UA850 UA		USE VTVM OR MULTIMETER ADD S:
207VTVM	211 85 V260 V		USE VTVM OR MULTIMETER
208VTVM	212 355 V		USE VTVM OR MULTIMETER 400CPS
244 18.9MC IF			
201TS-352/U	MULTIMETER		TROUBLE SHOOTING
202MK428/AR	TEST SET		TROUBLE SHOOTING

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203VTVM
204AN/GRM-4

VTVM
SIGNAL GENERATOR

TROUBLE SHOOTING
TROUBLE SHOOTING

R-510/ARC RADIO RCVR
ARC TYPE 12 R-510/ARC T-365/ARC CV-10 116-258MC VOICE
101 111 28 V
202TS-352/U 271 13 0500 KO
203TS-352/U 211 1 V281 V
245 110MC CONV OSC
145 .21MC-255MC INPUT FREQ RF TEST
244 85KC,239KC,15MC VARIOUS IF
212 1V-3V OUTPUT VOLT AC
221 20UA-155MA OUTPUT CUR DC
235 .5-2W OUTPUT POWER RF
201TS-352/U MULTIMETER
301ME-6A/U VTVM
302ARC-11935 HEADSET
303ARC-11934 CONNECTOR
304FERRIS 16C SIG GEN
306TS-11A/P MILLIAMMETER

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APPENDIX B

PHASE ONE FREQUENCY DATA SHEETS

APPENDIX B

PHASE ONE FREQUENCY DATA SHEETS

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600000 3025G-71/FCC	243 250	C 90	KC 1	
600000 4195G-71/FCC	243 250	C 90	KC 1	
613550A420TS-382/U	113 200	C 27	KC	PLUS OR MINUS 3DB ON RCVR
40701B2500S-8/U	2409200	C		5.95V, 5.4V PEAK TO PEAK
641600 421AN/URM-25	143 250	C 25	KC	30 MOD FLAT 7DB
643600 467TS-382A/U	143 250	C 5	KC	5 STEPS
643700 467TS-382A/U	143 250	C 5	KC	5 STEPS
643800 467TS-382A/U	143 250	C 5	KC	IN 5 STEPS
653400A461AN/URM-25	1431250	C 25	KC 5	5.1MC 30PC MOD.
653400A466AN/URM-25	1431250	C 25	KC 5	6.6MC 30PC MOD.
653400A493TS-382A/U	143 250	C 3	KC 5	.5VRMS MAX
657225 402TS-382/U	243 250	C 20	KC 1	
A 2A307TS-382A/U	143 400	C		30 PERCENT MOD
A 2A310TS-382A/U	143 400	C		
A 2A410TS-382A/U	143 400	C		30 PERCENT MOD
A 2A415TS-382A/U	143 400	C		30 PERCENT MOD
A 2A418TS-382A/U	143 400	C		30 PERCENT MOD
621266A401TS-382A/U	243 400	C 5	KC	
635660 484AN/URM-48	1432400	C	5	24-33-46MC RF
635660 489TS-382A/U	1432400	C	5	
635661 484AN/URM-48	1432400	C	5	24-33-46MC RF
635661 489TS-382A/U	1432400	C	5	
635662 484AN/URM-48	1432400	C	5	24-33-46MC RF
635662 489TS-382A/U	1432400	C	5	
643600 212TS-382/U	143 400	C		AUDIBLE SIG IN HANDSET
643700 212TS-382/U	143 400	C		AUDIBLE SIG IN HANDSET
643700A461TS-382/U	143 400	C		
643800 212TS-382/U	143 400	C		AUDIBLE SIG IN HANDSET
643800A461TS-382/U	143 400	C		
653400A226AN/URM-25	1431400	C	5	465KC
653400A229AN/URM-25	1431400	C	5	456KC
653400A232AN/URM-25	1431400	C	5	CONVERTER TUBE-HEADSET AU
653400A236AN/URM-25	1431400	C	5	12MC
653400A239AN/URM-25	1431400	C	5	6.6-12MC -HEADSET AUDIO
653400A242AN/URM-25	1431400	C	5	3.6-6.6MC
653400A245AN/URM-25	1431400	C	5	2-3.6MC
653400A302AN/URM-25	1431400	C	5	456KC
653400A311AN/URM-25	1431400	C	5	ADJ. RF CKT FOR MAX AC VOLT
653400A437AN/URM-25	1431400	C	5	6.6MC 30 PERCENT MOD.
653400A442AN/URM-25	1431400	C	5	
653400A453AN/URM-25	1431400	C	5	
653400A431AN/URM-25	1431400	C	5	.25V
658430 440TS-382A/U	143 400	C	5	15KC DEV
658430 426TS-588A/U	1432400	C		
A 2A426TS-382A/U	143 90	C		30 PERCENT MOD
A 2A429TS-382A/U	143 30	C		
A 4 418AN/ARM-42	242 96	C106	C10	
611280 402AN/GRA-6	142 20	C		OPERATIONAL SELF TESTING
611280 204AN/GRA-6	20 20	C		OPERATIONAL SELF TESTING
634395 408TS-382/U	243 22	C		
40701B441TS-382/U	1431	30 C 10	KC	
660272 401TS-382/U	143 20	C	5	20V

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660272 409FR-67/U	243 20	C	10	
A 2A427TS-382A/U	143 150	C		
640701R2520S-8/U	2409100	C		.7 TO 7.9V PEAK TO PEAK
57225 417TS-382/U	243 125	C 35	KC	20V P TO P
658160 403TS-65C/FMQ-1	142 190	C		
A 6 410TS-382A/U	242 300	C 6	KC 1	
636904A431TS-382A/U	112 300	C 20	KC	
640701A315TS-382/U	142 380	C420	C 2	COUPLED TO SCOPE 1.1 RATIO
640701A415TS-382A/U	143 300	C 3	KC	
640701A419TS-382A/U	143 300	C 35	KC	
640701A3140S-8A/U	2429380	C420		1TG1 FREQ COMPARISON
A 1A335AN/USM-81	500	C	1 KC	PULSE RATE
634479 331TS-382A/U	143 600	C		40 PCT MOD
653400A498FR-67/U	243 700	C 11	KC 5	
A 1A333AN/UPM-15	1539 5	KC		AOC ADJUSTMENT 50 PERCENT
600000 224SG-71/FCC	1552 25	KC 68	KC	
681730 401SG-71/FCC	243 3	KC194	KC 1	
A 6 312TS-382A/U	242 1	KC	10	
A 6 418TS-382A/U	1	KC		
605485B304TS-382E/U	113 1	KC		MOD PLATE CUR 240MA
613150 300TS-382/U	143 1	KC	5	TUNE FOR MAX AUDIO IN HEAD
613150 307TS-382/U	143 1	KC	1	NO AMPLITUDE SHOWN
613150 309TS-382/U	143 1	KC 2	KC 1	40 MW
613550A419TS-382/U	113 1	KC		3.5V RCVR OUTPUT
634479 339TS-382A/U	113 1	KC		TIME DELAY ADJUST
635660 260AN/URM-25	1432 1	KC	5	AUDIO 15KC DEV 1MVRF
635660 455AN/URM-48	1432 1	KC	5	15KC DEV
635660 477AN/URM-48	1432 1	KC	5	15KCDEV
635660 485AN/URM-48	1432 1	KC	5	24-33-46MC RF
635660 490TS-382A/U	1432 1	KC	5	
635660 495TS-382A/U	143 1	KC	5	
635660 422AN/URM-48	1432 1	KC	5	15KC DEV
635661 260AN/URM-25	1432 1	KC	5	AUDIO 15KC DEV 1MVRF
635661 460AN/URM-48	1432 1	KC	5	15KC DEV
635661 477AN/URM-48	1432 1	KC	5	15KCDEV
635661 485AN/URM-48	1432 1	KC	5	24-33-46MC RF
635661 490TS-382A/U	1432 1	KC	5	
635661 495TS-382A/U	143 1	KC	5	
635661 430AN/URM-48	1432 1	KC	5	15KC DEV
635662 260AN/URM-25	1432 1	KC	5	AUDIO 15KC DEV 1MVRF
635662 465AN/URM-48	1432 1	KC	5	15KC DEV
635662 477AN/URM-48	1432 1	KC	5	15KCDEV
635662 485AN/URM-48	1432 1	KC	5	24-33-46MC RF
635662 490TS-382A/U	1432 1	KC	5	
635662 495TS-382A/U	143 1	KC	5	
635662 437AN/URM-48	1432 1	KC	5	15KC DEV
636904A426TS-382A/U	113 1	KC		.5V OUTPUT TO PHANTOM MIKE
640701B215TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701B216TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701B217TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701B218TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701B219TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701B220TS-382/U	143 1	KC		AUDIBLE OUTPUT IN HEADSET
640701A310TS-382/U	143 1	KC		.015V RMS

640701A407TS-382A/U	143	1	KC	5	1VU OUTPUT METER DC IN 29.
640701A413TS-382A/U	143	1	KC		.015 VOLTS -1VU ON TRAN.M
640701A414TS-382A/U	143	1	KC		TO PRODUCE 80 MODULATION
643500A216TS-382A/U	143	1	KC	5	3V
643500A240AN/URM-48	1432	1	KC	5	AUDIO FREQ
643500A442TS-382A/U	143	1	KC	5	450 AND 15 OHM VOLT DIVIDE
643500A454TS-382A/U	143	1	KC	5	30UV
643500A420AN/URM-48	1432	1	KC	5	AUDIO 15KC DEV
643600 237TS-382/U	143	1	KC		2V
643600 463TS-382A/U	143	1	KC		85MV
643700A217TS-382A/U	143	1	KC		AUDIBLE TONE
643700 237TS-382/U	143	1	KC		2V
643700A239TS-382A/U	143	1	KC		2V
643700A462TS-382/U	143	1	KC		
643700 463TS-382A/U	143	1	KC		85MV
643800A214TS-382A/U	143	1	KC		2V
643800A236TS-382A/U	143	1	KC		2V
643800 237TS-382/U	143	1	KC		
643800A462TS-382/U	143	1	KC		85MV
643800 463TS-382A/U	143	1	KC		THROUGH .05UF-- HEADSET AUI
653400A221TS-328A/U	143	1	KC		MAXIMUM
653400A502FR-67/U	243	1	KC	2	3V AND 10V
6584260251TS-382/U	143	1	KC		20 TO 27.9MC 15KC DEV
6584260403AN/URM-48	1432	1	KC	5	27TO 38.9MC 15KC DEV
658427 224AN/URM-48	1432	1	KC	5	10 V RMS
658427 236TS-382/U	143	1	KC	5	3V
658427 239TS-382/U	143	1	KC	5	15KC DEV
658427 328AN/URM-48	1432	1	KC	5	15KC DEV
658427 336AN/URM-48	1432	1	KC	5	15KC DEV
658427 344AN/URM-48	1432	1	KC	5	15KC DEV
658427 366AN/URM-48	1432	1	KC	5	15KC DEV
658428 224AN/URM-48	1432	1	KC	5	10 V RMS
658428 236TS-382/U	143	1	KC	5	3V
658428 239TS-382/U	143	1	KC	5	15KC DEV
658428 328AN/URM-48	1432	1	KC	5	15KC DEV
658428 336AN/URM-48	1432	1	KC	5	15KC DEV
658428 344AN/URM-48	1432	1	KC	5	15KC DEV
658428 366AN/URM-48	1432	1	KC	5	
658430 229TS-382A/U	143	1	KC	5	.45V
658430 609TS-382A/U	143	1	KC	5	600 OHM OUTPUT LOAD
658430 612TS-382A/U	143	1	KC		APPROX. 600 OHM OUTPUT LOAI
658430 640	1432	1	KC	5	15KC DEV 1KC AUDIO
658430 441TS-382A/U	143	1	KC	5	.25V
658430 457AN/URM-48	1432	1	KC		15KC DEV
658430 463AN/URM-48	1432	1	KC	5	15KC CARRIER DEV
658430 479AN/URM-48	1432	1	KC	5	15KC DEV
658430 484AN/URM-48	1432	1	KC	5	20KC DEV
658430 485TS-382/U	143	1	KC	5	.25V
658430 403TS-588A/U	1432	1	KC	5	15KC DEV
658430 421TS-588A/U	1432	1	KC	5	TO PROVIDE 15KC DEV
658430 427TS-588A/U	1432	1	KC	5	15KC DEV
658430 433TS-382A/U	143	1	KC	5	.25V
658430 279TS-588A/U		1	KC	5	58MC 15KC DEV
658430 284TS-585A/U		1	KC	5	15KC DEV 58MC RF
658430 290TS-588A/U		1	KC	5	15 KC DEV.
660360 406TS-382A/U	243	1	KC	10	

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660650 304SG-71	143	1	KC			
681730 217SG-15/PCM	243	1	KC	20	KC 1	
6584260203AN/URM-48	1432	1000	KC			20-27.9MC 15KC DEV
611498 307FR-67/U	233	1225	KC	1600	KC	375
611498 409FR-67/U	243	1225	KC	1600	KC	
611498 410TA-182/U	243	1225	KC	1600	KC	
629782E312FR-67/U	243	1225	KC			BEAT 2 CONV FOR 6 BEAT/SEC
629782E313FR-67/U	243	1225	KC			+3CPS TOL
629782E315FR-67/U	243	1275	KC			+1CPS TOL
629782E426FR-67/U	243	1225	KC	1275	KC	BIAS CONTROL ADJUSTED FOR 1.
629782E434FR-67/U	243	1225	KC			+2 CPS TOL XMISSION CKT TI
629782E310FR-67/U	243	1325	KC			+3CPS
629782E311FR-67/U	243	1325	KC			+3CPS TOL
629782E425FR-67/U	243	1325	KC			+1CPS TOL
629782E433FR-67/U	243	1325	KC			+2 CPS TOL XMISSION CKT TI
634395 403TS/382/U	243	15	KC		1	+3CPS
660272 406TS-382/U	143	16	KC		5	77.5 MV
660272 405FR-67/U	243	16	KC		125	
611390 302RC-120-B	113	18	KC		1	CAL OF OUTPUT SIGNAL
611390 402RC-120-B	113	18	KC		1	CAL OF OUTPUT SIG
611390 407BFO	113	18	KC	30	KC10	INPUT TO LIMITER
611390 4060SCILLOSCOPE	217	18	KC	30	KC10	ACROSS PINS 4+5 OF T3
634479 340AN/USM-50	217	185	KC			PRF
613150 301TS-382/U	143	2	KC		5	TUNE FOR MIN AUDIO IN HEAD.
635660 486AN/URM-48	1432	2	KC		5	24-33-46MC RF
635660 491TS-382A/U	1432	2	KC		5	
635661 486AN/URM-48	1432	2	KC		5	24-33-46MC RF
635661 491TS-382A/U	1432	2	KC		5	
635662 486AN/URM-48	1432	2	KC		5	24-33-46MC RF
635662 491TS-382A/U	1432	2	KC		5	
658430 442TS-382A/U	143	2	KC		5	.25V
658430 428TS-588A/U	1432	2	KC		5	15KC DEV
643800A463TS-382/U	143	25	KC			
613550A421TS-382/U	113	27	KC	35	KC	PLUS OR MINUS 6DB ON RCVR
640701B311SCR-211	243	2955	KC			
613550A414AN/URM-25A	152	3	KC	11	KC	BAND 4
635660 487AN/URM-48	1432	35	KC		5	24-33-46MC RF
635660 492TS-382A/U	1432	35	KC		5	
635661 487AN/URM-48	1432	35	KC		5	24-33-46MC RF
635661 492TS-382A/U	1432	35	KC		5	
635662 487AN/URM-48	1432	35	KC		5	24-33-46MC RF
635662 492TS-382A/U	1432	35	KC		5	
543700A464IP-173/U	2552	4	KC	17	KC	
643800A464IP-173/U	2552	4	KC	17	KC	

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681730 403FR-67/U	243	45	KC194	KC	1	
600000 414SG-71/FCC	1552	5	KC			PG 445 DISTORTION TEST PG
613550A409AN/URM-25A	152	5	KC	20		SIG OUTPUT 2X NEW 2V POIN
635660 488AN/URM-48	1432	5	KC	5		24-33-46MC RF
635660 493TS-382A/U	1432	5	KC	5		
635661 488AN/URM-48	1432	5	KC	5		24-33-46MC RF
635661 493TS-382A/U	1432	5	KC	5		
635662 488AN/URM-48	1432	5	KC	5		24-33-46MC RF
635662 493TS-382A/U	1432	5	KC	5		
658430 429TS-588A/U	1432	5	KC	5		15KC DEV
658430 490AN/URM-48	144	5	KC			1MV
613550A410AN/URM-25A	152	85	KC	20		10X
634425 318FR-67/U	212	85	KC	86	KC	ADJUST L201
657225G316TS-382A/U	243	8	KC			
635660 270AN/URM-25	1552	15	KC	5		DEV 1KC AF
635660 456AN/URM-48	1552	15	KC	5		1KC AF
635660 478AN/URM-48	1552	15	KC	5		1KC AF
635660 483AN/URM-48	1552	15	KC	5		24-33-46MC RF
635660 423AN/URM-48	1552	15	KC	5		1KC AF
635661 270AN/URM-25	1552	15	KC	5		DEV 1KC AF
635661 461AN/URM-48	1552	15	KC	5		1KC AF
635661 478AN/URM-48	1552	15	KC	5		1KC AF
635661 483AN/URM-48	1552	15	KC	5		24-33-46MC RF
635661 431AN/URM-48	1552	15	KC	5		1KC AF
635662 270AN/URM-25	1552	15	KC	5		DEV 1KC AF
635662 438AN/URM-48	1552	15	KC	5		1KC AF
635662 466AN/URM-48	1552	15	KC	5		1KC AF
635662 478AN/URM-48	1552	15	KC	5		1KC AF
635662 483AN/URM-48	1552	15	KC	5		24-33-46MC RF
643500A239AN/URM-48	1552	15	KC	5		DEVIATION
643500A419AN/URM-48	1552	15	KC	5		DEVIATION 47 TO 55.4MC
6584260204AN/URM-48	1552	15	KC	125		20-27.9MC 1KC AF
6584260404AN/URM-48	1552	15	KC	125		20 TO 27.9MC 1000M
658427 225AN/URM-48	1552	15	KC	5		27TO 38.9MC 1KC AUDIO
658427 327AN/URM-48	1552	15	KC	5		28MC 1KC AF
658427 335AN/URM-48	1552	15	KC	5		34MC 1KC AF
658427 343AN/URM-48	1552	15	KC	5		1KC AF
658427 365AN/URM-48	1552	15	KC	5		3.35MC 1KC AF.75 10UV 1-10I
658428 225AN/URM-48	1552	15	KC	5		
658428 327AN/URM-48	1552	15	KC	5		39MC
658428 335AN/URM-48	1552	15	KC	5		46MC
658428 343AN/URM-48	1552	15	KC	5		1KC AF 53.9MC
658428 365AN/URM-48	1552	15	KC	5		
658430 641	1552	15	KC	5		1KC AUDIO 15KC DEV
658430 456AN/URM-48	1552	15	KC	5		1KC AUDIO
658430 462AN/URM-48	1552	15	KC	5		47 TO 58MC 1KC AUDIO
658430 478AN/URM-48	1552	15	KC	5		52MC
658430 402TS-588A/U	1552	15	KC	5		47TO 58MCS
658430 420TS-588A/U	1552	15	KC	5		1KC AUDIO
658430 425TS-588A/U	1552	15	KC	5		52MC
658430 4871P-173/U	2109	15	KC	20	KC	5KC PER DIVISION 15MIN.20I

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658430	280TS-588A/U	15	KC	5	58MC	1UV 1KC AUDIO
658430	283TS-585A/U	15	KC	5	58MC	1KC AUDIO
658430	289TS-588A/U	15	KC	5	58MC	
A	2A431TS-382A/U	143	10	KC		
613550A	411AN/URM-25A	152	125	KC	20	100X
643500A	448AN/URM-48	1552	12	KC	5	
643500A	445IP-173/U	2109	12	KC 30	KC 9999ON	PAN INDICATOR
660650	412SG-71	143	12	KC		
660650	416SG-71	143	12	KC 68	KC	
660650	422SG-71/FCC	143	12	KC 68	KC	
681730	301SG-71/FCC	243	12	KC 99	KC	
613550A	412AN/URM-25A	152	16	KC	25	1000X
A	6 308DEV.METER	245	20	KC	10	
600000	219SG-71/FCC	1552	24	KC		24 KC/85 KC PK/161.75 MC
613550A	415AN/URM-25A	152	27	KC 95	KC	BAND 7
613550A	413AN/URM-25A	152	20	KC	30	10000X
643700A	463TS-382/U	143	25	KC		
658430	483AN/URM-48	1552	20	KC	5	1KC AUDIO
660650	410SG-71	143	28	KC		
681730	213SG-71/FCC	243	20	KC100	KC 1	
600000	415AN/URM-70	1552	39	KC		PG 445 DISTORTION TEST PG
643500A	451AN/URM-48	1552	30	KC		1KC AF
600000	216AN/URM-70	243	68	KC3395	MC	
660650	408SG-71	143	68	KC		
660650	414SG-71	143	68	KC		51MV INPUT
660650	418SG-71	143	68	KC		
A	6 406FR-5/U	245	75	KC150	KC 1	
640701B	427AN/URM-25	145	75	KC		3 MV
A	14A309FERRIS 16C	1451	85	KC		.1V 30PERCENT AT 1KC
600000	218AN/URM-70	1552	85	KC		PEAK DEVIATION
636904A	419AN/URR-23A	214	85	KC		ZERO BEAT BANDWIDTH 6DB P
658427	351RT-67/GRC		85	KC		11800FOR X2 SIGNAL VOLTAGE
611390	301SIG.GEN	113	100	KC	10	CAL OF 100KC OSC
611390	401SIG.GEN	113	100	KC	10	CAL OF 100KC OSC
613550A	318AN/URM-25A	155	100	KC		LOCAL OSC BAND 1
613550A	325AN/URM-25A	155	110	KC		RF BAND 1
613550A	403AN/URM-25A	155	110	KC200	KC	TEST FREQUENCIES BAND 1
613565	310SCR-211	242	142	KC146	KC 1	
658427	354RT-67/GRC		185	KC		NOT GREATER THAN FOR X100
658427	353RT-67/GRC		120	KC		22600FOR X 10 SIG VOLTAGE
A	4 401AN/URM-25F	245	200	KC 1	MC10	MOD 30 PC 400CPS
A	4 404AN/URM-25F	245	200	KC 1	MC10	MOD 30 PC 400CPS
A	4 405AN/URM-25F	245	210	KC 17	MC10	LOOP RCVR AND COMPASS
A	4 409AN/URM-25F	245	210	KC 95	MC10	MOD 30 PC 400CPS
A	4 411AN/URM-32	245	210	KC 95	MC10	MOD30 PC 400CPS
A	4 416AN/URM-25F	245	210	KC 95	MC10	

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600000 223AN/URM-70	155220	KC		PEAK DEVIATION
613550A320AN/URM-25A	155 200	KC		BAND 1
A 4 301AN/URM-25F	245 380	KC	16	MC10
605485B303AN/URM-79	245 350	KC		
613550A407AN/URM-25A	155 360	KC	20	MC
636904A421AN/URR-23A	214 300	KC		
ZERO BEAT TO VFO BANDS 2 4 7 60DB PT				
613550A307AN/URM-25A	154 455	KC		
613550A3130S-8A/U	2129436	KC474	KC	
640701B221AN/URM-25	1441455	KC		
640701B222AN/URM-25	1441455	KC		
640701B312AN/URM-25	144 455	KC		
640701B314AN/URM-25	144 455	KC		
640701B244AN/URM-25	145 445	KC		
641600 305TS-588/U	1441455	KC		
641600 307TS-588/U	144 455	KC		
653400A227AN/URM-25	144 455	KC457	KC	
653400A224AN/URM-25	1441465	KC		
653400A228AN/URM-25	1441456	KC		
653400A231AN/URM-25	1441456	KC		
653400A301AN/URM-25	1441456	KC		
600000 307AN/URM-32	244 4032	KC4368	KC 1	
IF FREQ BAND 1 AM 400C MOI SCOPE ALINEMENT SWP GEN RE AUDIBLE OUTPUT IN HEADSET AUDIBLE OUTPUT IN HEADSET LESS THAN 3VOLTS OUT 300UV 130UV TO 70000UV 16 STEPS MOD 30PERCENT 400C				
640701B324AN/URM-25	145 550	KC		
640701B325AN/URM-25	145 950	KC		
LESS THAN 3V OUT LESS THAN 3V OUT				
A 14A311FERRIS 16C	1451 52	MC		
A 14A312FERRIS 16C	1451 21	MC		
640701B235AN/URM-25	145 5	MC 32	MC	
640701B434AN/URM-25	145 750	MC		
613550A332TUNING DIAL	211 1	MC		
640701B326AN/URM-25	145 1100	MC		
6584260242AN/URM-25	144 137	MC		
6584260313AN/URM-25	144 137	MC		
6584260423AN/URM-25	144 131	MC 141	MC	
658427 248AN/URM-48	144 137	MC		
658427 304AN/URM-25	144 137	MC 143	MC	
658427 371AN/URM-25	144 1355	MC 1445	MC	
658428 248AN/URM-48	144 137	MC		
658428 304AN/URM-25	144 137	MC 143	MC	
658430 251TS-588A/U	144 137	MC 143	MC	
658430 309TS-588A/U	144 133	MC 147	MC	
658430 657AN/URM/48	144 133	MC		
658430 661AN/URM/48	144 137	MC		
658430 471AN/URM-25	144 137	MC 137	MC	
658430 472AN/URM-25	144 135	MC 145	MC	
6584260231AN/URM-48	144 14	MC		
6584260241AN/URM-25	144 143	MC		
6584260302AN/URM-48	144 14	MC		
6584260311AN/URM-25	144 14	MC		
6584260312AN/URM-25	144 143	MC		
10UV 30PERCENT AT 1KC 10UV 30PERCENT AT 1KC 1 TO 7 UV INPUT 3 MV MAX ON METER LESS THAN 3V OUT 5 .5V 5 5 BAND WIDTH LIMITS 6DB 005.5V 005 DISCRETE FREQUENCIES .006V 5 APPR.90KC PLUS-6DB POINTS 005.5V 005 DISCRETE FREQUENCIES .006V 005.15V APPROX .15V SERIES.01VF 005THROUGH .003UF 150MV 005THROUGH .003UF 150MV 005 NO AMPLITUDE SHOWN APPROX NO AMPLITUDE SHOWN 005.026V TO 1.0V 5 .5V 0051V .5V 5 5				

658427	242AN/URM-48	144	14	MC		0055V
658427	246AN/URM-48	144	143	MC		005.5V
658427	251AN/URM-48	144	14	MC		0053.6MV
658427	294AN/URM-48	144	14	MC		005
658427	301AN/URM-48	144	14	MC		0051V .006UF BLOCKING
658427	307AN/URM-48	144	14	MC		005.5V .006UF BLOCKING
658428	242AN/URM-48	144	14	MC		0055V
658428	246AN/URM-48	144	143	MC		005.5V
658428	251AN/URM-48	144	14	MC		0053.6MV
658428	294AN/URM-48	144	14	MC		005
658428	301AN/URM-48	144	14	MC		0051V .006UF BLOCKING
658428	307AN/URM-48	144	14	MC		005.5V .006UF BLOCKING
658430	232AN/URM-48	144	14	MC		005.15V THROUGH .01 UF
658430	235AN/URM-48	144	14	MC		0052.6MV APPROX THROUGH .01 UF
658430	248TS-588A/U	144	14	MC		005.15 VOLTS
658430	303TS-588A/U	144	14	MC		005SERIES .01 UF .15V
658430	306TS-588A/U	144	14	MC		005 2MV APPROX SERIES.01 UF
658430	616AN/URM-48	144	14	MC		005
658430	655AN/URM/48	144	147	MC		005THROUGH .003UF 150MV
658430	659AN/URM/48	144	143	MC		005THROUGH .003UF 150MV
640701B428AN/URM-25		145	15	MC		3 MV
640701B435AN/URM-25		145	15	MC		3 MV
641600	310TS-588/U	145	15	MC	27	MODULATED
641600	411AN/URM-25	145	15	MC	18	5 UV MAX INPUT
641600	413AN/URM-25	145	15	MC	18	2 UV MAX INPUT FOR 10MW OU
640701B424AN/URM-25		1451	16	MC		400C30 PCT 2500MVOUT
540701B327AN/URM-25		145	1900	MC		LESS THAN 3V OUT
640701B223AN/URM-25		1451	2	MC		40 TO 70 UV
640701B229AN/URM-25		1451	2	MC		
640701B230AN/URM-25		1451	2	MC		5 STEPS
640701B242AN/URM-25		145	2	MC	3	40 TO 70 UV
643600	427AN/URM-48	145	2	MC100	MC	CHECK FOR SPURIOUS RESPONSE
643700	427AN/URM-48	145	2	MC100	MC	CHECK FOR SPURIOUS RESPONSE
643700A438AN/URM-48		145	2	MC100	MC	100MV
643800	427AN/URM-48	145	2	MC100	MC	CHECK FOR SPURIOUS RESPONSE
643800A438AN/URM-48		145	2	MC100	MC	100MV
653400A244AN/URM-25		1451	2	MC	36	005HEADSET AUDIO
653400A310AN/URM-25		1451	2	MC		005ADJ.RF CKT FOR MAX AC VOLT.
653400A414AN/URM-25		145	2	MC		SENS.TEST TUNABLE 20KC 3
653400A424AN/URM-25		1451	2	MC		005NONINDUCTIVE -AUDIO OUT LO.
653400A452AN/URM-25		1451	2	MC	36	BAND 3 SPOT FREQ.
653400A318RT-77/GRC-9			2	MC		0055.4K RES.ANT LOADING
658427	358AN/URM-48	145	2	MC100	MC	VARIABLE TUNING 160UV
658428	358AN/URM-48	145	2	MC100	MC	VARIABLE TUNING 410 UV
6584260421AN/URM-25		145	20	MC	195	5 .5UV
640701B319AN/URM-25		145	2100	MC		LESS THAN 3V OUT
640701B429AN/URM-25		145	26	MC		3 MV
640701B436AN/URM-25		145	26	MC		3 MV
641600	312TS-588/U	145	27	MC	5	TUNE FOR PEAK BAND 2
641600	419AN/URM-25	145	27	MC	1891	BAND 1 10000-1.BAND2 3160-
653400A415AN/URM-25		145	28	MC		SENS.TEST TUNABLE 20KC 3
653400A425AN/URM-25		1451	28	MC		005NONINDUCTIVE -AUDIO OUT LO.
1	6 301AN/ARM-8	245	2987	MC	25	1
A	6 303AN/URM-79	245	2987	MC		1 USED WHEN TEST SET UNAVAIL

640701B317AN/URM-25	145	2900 MC			LESS THAN 3V OUT
6584260261TS-174/U	245	305 MC	405 MC	12	DIAL CAL EA.1MC 5KCTOL
6584260262TS-174/U	245	305 MC	405 MC	05	REPEATABILITY OF DIAL CAL
6584260341SCR-211	245	305 MC		01	
6584260343SCR-211	245	305 MC	385 MC	13	EACH 100KC STEP 5KC TOL
658427 234TS-174/U	245	305 MC			100MCDIAL DETENT POS 10TH ZERO
658427 311SCR-211	245	305 MC	385		100KC STEPS +-5KC 10TH MCD
658427 361SCR-211	245	3041 MC	3059 MC		NOT GREATER THAN LIMITS SHI
658428 234TS-174/U	245	305 MC			100MCDIAL DETENT POS 10TH ZERO
658428 311SCR-211	245	305 MC	385		100KC STEPS +-5KC 10TH MCD
657225G308TS497/URR	245	32 MC	165 MC	1	
657225G309SCR-211	245	32 MC	165 MC	1	
636904A323LP-3	144	345 MC			100UV
636904A333LP-3	144	345 MC			6DB PAD
636904A324LM-14	244	345 MC			
658427 362SCR-211	245	3441 MC	3459 MC		NOT GREATER THAN LIMITS SHI
653400A241AN/URM-25	1451	36 MC	66 MC		005 HEADSET AUDIO
653400A309AN/URM-25	1451	36 MC			005ADJ.RF CKT FOR MAX AC VOLT.
653400A416AN/URM-25	145	36 MC			SENS.TEST TUNABLE 20KC 3 I
653400A426AN/URM-25	1451	36 MC			005NONINDUCTIVE -AUDIO OUT LO.
653400A451AN/URM-25	1451	36 MC	66 MC		BAND 2 SPOT FREQ.
653400A476AN/URM-25	145	36 MC		555	TUNE +-2MC BAND 3
653400A319RT-77/GRC-9		36 MC			0055.4K RES.ANT LOADING
640701B329AN/URM-25	145	3800 MC			LESS THAN 3V OUT
6584260222AN/URM-48	114	3800 MC		125	5.45MC
640701B417AN/URM-25	1451	399 MC			400C30 PCT 2500MVOUT
643500A426AN/URM-25	144	3925 MC	4675 MC	5	X2BANDWIDTH70KC X1K 750KCM.
6584260342SCR-211	245	395 MC		01	
658427 310SCR-211	245	395 MC			005RCVR OSCILLATOR
658427 363SCR-211	245	3941 MC	3959 MC		NOT GREATER THAN LIMITS SHI
658428 310SCR-211	245	395 MC			005RCVR OSCILLATOR
634479 321BUILT IN CRO	214	4 MC		12	BANDWIDTH
640701B418AN/URM-25	1451	4 MC			400C30 PCT 2500MVOUT
635660 306AN/URM-25	1440	4250 MC	4350 MC	15	DISC.ALINEMENT
635661 306AN/URM-25	1440	4250 MC	4350 MC	15	DISC.ALINEMENT
635662 306AN/URM-25	1440	4250 MC	4350 MC	15	DISC.ALINEMENT
635660 220AN/URM-25	1440	427 MC	437 MC		0051V
635660 310AN/URM-25	1440	427 MC	433 MC		005.1V
635661 220AN/URM-25	1440	427 MC	437 MC		0051V
635661 310AN/URM-25	1440	427 MC	433 MC		005.1V
635662 220AN/URM-25	1440	427 MC	437 MC		0051V
635662 310AN/URM-25	1440	427 MC	433 MC		005.1V
643500A224AN/URM-25	144	4275 MC			005GREATER THAN 250 MV IF FRI
643500A429AN/URM-25	144	4275 MC	4325 MC	005	
643500A308AN/URM-25	145	4275 MC	4325 MC		005 THROUGH .01 UF CAP.
643600 449I-208	144	427 MC			
643700A237AN/URM-25	144	427 MC			
643700 449I-208	144	427 MC			
643700A449I-208	144	427 MC			140UV
643800A234AN/URM-25	144	427 MC			
643800A449I-208	144	427 MC	433 MC		140UV
643800 449I-208	144	427 MC			

643600	2351-208	144	4285	MC	4315	MC	2 DISCRETE FREQ
643700	2351-208	144	4285	MC	4315	MC	2 DISCRETE FREQ
643800	2351-208	144	4285	MC	4315	MC	2 DISCRETE FREQ
635660	222AN/URM-25	1440	43	MC			005250UV
635660	300AN/URM-25	1440	43	MC			005.1V
635660	303AN/URM-25	1440	43	MC			005500UV
635660	308AN/URM-25	1440	43	MC			005.1V
635660	312AN/URM-25	1440	43	MC			005500UV
635661	222AN/URM-25	1440	43	MC			005250UV
635661	300AN/URM-25	1440	43	MC			005.1V
635661	303AN/URM-25	1440	43	MC			005500UV
635661	308AN/URM-25	1440	43	MC			005.1V
635661	312AN/URM-25	1440	43	MC			005500UV
635662	222AN/URM-25	1440	43	MC			005250UV
635662	300AN/URM-25	1440	43	MC			005.1V
635662	303AN/URM-25	1440	43	MC			005500UV
635662	308AN/URM-25	1440	43	MC			005.1V
635662	312AN/URM-25	1440	43	MC			005500UV
643500A	219AN/URM-25	144	43	MC			005IF FREQUENCY -BLOCKING CAP
643500A	223AN/URM-25	144	43	MC			005GREATER THAN 250 MV IF FRI
643500A	227AN/URM-25	144	43	MC			005IF FREQUENCY
643500A	229AN/URM-25	144	43	MC			005IF FREQ.
643500A	245AN/URM-25	144	43	MC			005SIGNAL FOR IF STAGE GAIN TI
643500A	301AN/URM-25	144	43	MC			005IF FREQ THROUGH .01UF CAP
643500A	304AN/URM-25	144	43	MC			005IF FREQ THROUGH .01UF CAP
643600	2131-208	1441	43	MC			20 AUDIBLE SIG IN HANDSET
643600	2141-208	144	43	MC			
643600	2331-208	144	43	MC			70 UV
643600	2431-208	144	43	MC			1V
643600	308AN/URM-48	144	43	MC			
643600	313AN/URM-48	144	43	MC			MAX LEVEL
643600	4461-208	144	43	MC			050
643700	2131-208	1441	43	MC			20 AUDIBLE SIG IN HANDSET
643700	2141-208	144	43	MC			
643700A	218AN/URM-25	1441	43	MC			AUDIBLE TONE
643700A	219AN/URM-25	144	43	MC			
643700A	221AN/URM-25	144	43	MC			
643700	2331-208	144	43	MC			
643700A	235AN/URM-25	144	43	MC			500UV
643700	2431-208	144	43	MC			1V
643700A	305AN/URM-48	144	43	MC			
643700	308AN/URM-48	144	43	MC			MAX LEVEL
643700	313AN/URM-48	144	43	MC			050
643700	4461-208	144	43	MC			140UV
643700A	4471-208	144	43	MC			5MV
643700A	4481-208	144	43	MC			20 AUDIBLE SIG IN HANDSET
643800	2131-208	1441	43	MC			
643800	2141-208	144	43	MC			
643800A	215AN/URM-25	1441	43	MC			
643800A	216AN/URM-25	144	43	MC			
643800A	218AN/URM-25	144	43	MC			
643800A	232AN/URM-25	144	43	MC			500UV
643800	2331-208	144	43	MC			70UV
643800	2431-208	144	43	MC			1V
643800A	305AN/URM-48	144	43	MC			
643800	308AN/URM-48	144	43	MC			

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643800	313AN/URM-48	144	43	MC				MAX LEVEL
643800	4461-208	144	43	MC			050	
643800A	4471-208	144	43	MC			140UV	
657225E	301SCR-211	245	43	MC	2035	MC 1		
657225E	304TS-497/U	245	43	MC	2035	MC 1		
643500A	225AN/URM-25	144	4325	MC				005GREATER THAN 250 MV IF FR
643600	4481-208	144	433	MC				
643700A	236AN/URM-25	144	433	MC				
643700	4481-208	144	433	MC				
643800A	233AN/URM-25	144	433	MC				
643800	4481-208	144	433	MC				
658427	373AN/URM-48	144	4405	MC	4495	MC 5		BANDWIDTH 6DB POINTS
658428	373AN/URM-48	144	4405	MC	4495	MC 5		BANDWIDTH 6DB POINTS
6584260	217AN/URM-48	144	445	MC	535	MC		005100 KC STEPS 3800 UV
6584260	219AN/URM-48	144	445	MC				00557UV TO 4800UV
6584260	305AN/URM-48	144	445	MC				00540UA AND 70UA ON LIMITER M
658427	254AN/URM-48	144	445	MC				0054MV
658427	260AN/URM-48	144	445	MC	535	MC		005100KC STEPS 10TH MCS DIAL
658427	264AN/URM-48	144	445	MC				00557UV
658427	299AN/URM-48	144	445	MC				005
658427	312AN/URM-48	144	445	MC	535	MC		005 DISCRETE VALUES
658428	254AN/URM-48	144	445	MC				0054MV
658428	260AN/URM-48	144	445	MC	535	MC		005100KC STEPS 10TH MCS DIAL
658428	264AN/URM-48	144	445	MC				00557UV
658428	299AN/URM-48	144	445	MC				005
658428	312AN/URM-48	144	445	MC	535	MC		005 DISCRETE VALUES
636904A	326LP-3	144	47	MC	57	MC		1000UV
6584260	424AN/URM-25	144	486	MC	504	MC 5		WIDTH OF SELECTIVITY CURVE
658427	350AN/URM-25	144	4907	MC	4993	MC 5		CENTER F.TO 6DB DOWN POINT
634425	308AN/USM-50	212	5	MC		10		BANDWIDTH.707POINTS
636904A	328LP-3	114	53	MC				100MV INPUT
640701B	238AN/URM-25	145	5	MC	8	MC		25 TO 45 UV
641600	313TS-588/U	145	5	MC	95	MC		TUNE FOR PEAK BAND 3
641600	414AN/URM-25	145	5	MC				30 PERCENT MOD 400C
653400A	417AN/URM-25	145	51	MC				SENS.TEST TUNABLE 20KC 3
653400A	427AN/URM-25	1451	51	MC				005NONINDUCTIVE -AUDIO OUT LO
553400A	460AN/URM-25	1451	51	MC				005250-2500 CAF 500 UV 30PC M
6584260	220AN/URM-48	144	535	MC				00529UV TO 3800UV
6584260	304AN/URM-48	144	535	MC				00540UA AND 70UA ON LIMITER M
658427	256AN/URM-48	144	535	MC				0053.8MV
658427	266AN/URM-48	144	535	MC				00529UV
658427	315AN/URM-48	144	535	MC				00570UA
658427	605AN/URM-48	144	545	MC				005
658428	256AN/URM-48	144	535	MC				0053.8MV
658428	266AN/URM-48	144	535	MC				00529UV
658428	315AN/URM-48	144	535	MC				00570UA
658428	605AN/URM-48	144	545	MC				005
A	1A412AN/USM-81	2429	6	MC	8	MC		BETWEEN 3 DB POINTS BANDWID
A	1A327AN/USM-81	2409	6	MC		10		APPROX
640701B	419AN/URM-25	1451	6	MC				400C30 PCT 2500MVOUT
640701B	430AN/URM-25	145	6	MC				3 MV
640701B	437AN/URM-25	145	6	MC				3 MV

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A 6 402AN/URM-79	245	655	MC	10437	MC	1	
653400A238AN/URM-25	1451	66	MC	12	MC		005400CPS AF DISCRETE VALUE.
653400A307AN/URM-25	1451	66	MC				005ADJ.RF CKT FOR MAX AC VOLT
653400A418AN/URM-25	145	66	MC				SENS.TEST TUNABLE 20KC 3
653400A428AN/URM-25	1451	66	MC				005NONINDUCTIVE -AUDIO OUT LO.
653400A436AN/URM-25	1451	66	MC				00510UV 400CAF 30 PERCENT MOD
653400A450AN/URM-25	1451	66	MC	12	MC		BAND 1 SPOT FREQ.
653400A465AN/URM-25	1451	66	MC				005MAX UND.OUT+2-5DB 400C REF
653400A471AN/URM-25	1451	66	MC				005500UV
653400A475AN/URM-25	145	66	MC			303	TUNE +-2MC BAND 2
653400A317RT-77/GRC-9		66	MC	112	MC		005DUMMY ANTENNA DISCRETE FR.
653400A320RT-77/GRC-9		66	MC				0055.4K RES.ANT LOADING
640701B331AN/URM-25	145	7600	MC				LESS THAN 3V OUT
640701B420AN/URM-25	1451	799	MC				400C30 PCT 2500MVOUT
640701B240AN/URM-25	145	8	MC	32	MC		20 TO 35 UV
640701B332AN/URM-25	145	8800	MC				LESS THAN 3V OUT
640701B421AN/URM-25	1451	8	MC				400C30 PCT 2500MVOUT
641600 314TS-588/U	145	95	MC	18	MC		TUNE FOR PEAK BAND 4
653400A419AN/URM-25	145	93	MC				SENS.TEST TUNABLE 20KC 3
653400A429AN/URM-25	1451	93	MC				005NONINDUCTIVE -AUDIO OUT LO
634425 402AN/UPM-58	246	10	MC				MAX WIDTH.SIDE LOBES DOWN
640701B224AN/URM-25	1451	10	MC				20 TO 35 UV
640701B228AN/URM-25	1451	10	MC				
640701B225AN/URM-25	1450	12	MC				
640701B422AN/URM-25	1451	12	MC				400C30 PCT 2500MVOUT
640701B431AN/URM-25	145	12	MC				3 MV
640701B438AN/URM-25	145	12	MC				3 MV
640701B440AN/URM-25	1451	12	MC			30	PCT MOD 30CPS TO 10 KC
653400A235AN/URM-25	1451	12	MC				005400CPS AF- HEADSET AUDIO
653400A308AN/URM-25	1451	12	MC				005ADJ.RF CKT FOR MAX AC VOLT.
653400A500AN/URM-9	145	12	MC				005 GENERATE
653400A420AN/URM-25	145	12	MC				SENS.TEST TUNABLE 20KC 3
653400A430AN/URM-25	1451	12	MC				005NONINDUCTIVE -AUDIO OUT LO.
653400A474AN/URM-25	145	12	MC			166	TUNE +-2MC BAND 1
653400A507AN/URM-9	245	12	MC				005TRANS ZERO BEAT-VOLTS 5.4-
653400A508AN/URM-9	245	12	MC				02 TRANS ZERO BEAT-VOLTS 7.5-
653400A321RT-77/GRC-9		12	MC				0055.4K RES.ANT LOADING
653400A501RT-77/GRC-9		12	MC				008ZERO BEAT ON RCUR IN NET P
653400A499RT-77/GRC-9		12	MC				005ZERO BEAT TO F METER
653400A314AN/URM-79	245	112	MC				005 DISCRETE -XMTR TUNED 11.21
658430 416AN/URM-48	144	1495	MC	1505	MC		APPROX. 85KC+-10KC TOL
A 2A306TS-413/U	144	15	MC				TUNE RCVR TO 131MC
658250 302TS-497A/URR	245	15	MC	304	MC		UNMODULATED
658430 238AN/URM-48	144	15	MC				5.2MV APPROX THROUGH .0031
658430 254AN/URM-48	144	15	MC				005 IN SERIES .003 UF 12UV
658430 257AN/URM-48	144	15	MC				005 IN SERIES .003 UF
658430 260AN/URM-48	144	15	MC				005 24 UV APPROX -SERIES .0031
658430 312TS-588A/U	144	15	MC				00512 TO 150UV APPROX.

658430 622AN/URM-48	144	15	MC	005	
658430 414AN/URM-48	144	15	MC	005THROUGH .003 UF	
640701B333AN/URM-25	145	15200	MC	LESS THAN 3V OUT	
640701B423AN/URM-25	1451	1599	MC	400C30 PCT 2500MVOUT	
640701B334AN/URM-25	145	17600	MC	LESS THAN 3V OUT	
636904A335LP-3	144	194	MC	10UV	
636304A410AN/URM-25	144	194	MC	FIRST IF.30PCT MOD.1000C	
636904A413AN/URM-25	144	194	MC		
6584260416AN/URM-48	145	195	MC100	MC125 .5UV	
613565 403MODEL 80	245	20	MC160	MC 1	
635660 226AN/URM-48	1450	20	MC	00530UV	
635660 231AN/URM-48	1450	20	MC	0053UV	
635660 317AN/URM-48	1450	20	MC	3 UV	
635660 366AN/URM-48	1450	20	MC	3UV	
635660 384AN/URM-48	1450	20	MC 55	MC 0051.5UV	
635660 419AN/URM-48	1452	20	MC	00515KC DEV.	
635661 384AN/URM-48	1450	20	MC 55	MC 0051.5UV	
635662 384AN/URM-48	1450	20	MC 55	MC 0051.5UV	
636904A405AN/URM-25	144	20	MC 299	MC FIRST IF.30PERCENT MOD 100	
643600 309AN/URM-48	145	20	MC		
643600 453TS-174B/U	243	20	MC	015	
6584260263TS-174/U	245	20	MC 27	MC 05 DIAL CAL EA.1MC 7.5KC TOL	
6584260461TS-174/U	245	20	MC 27	MC 05 EACH MC 9KC TOL	
658427 619AN/URM-48	115	20	MC	005	
658428 619AN/URM-48	115	20	MC	005	
6584260202AN/URM-48	1452	200	MC 279	MC 5 SET TO TUNING DIAL EA 100K	
6584260206AN/URM-48	145	200	MC 279	MC 5 SET TO TUNING DIAL 1UV	
6584260208AN/URM-48	145	200	MC	5 .4UV 5UV 103UV	
6584260402AN/URM-48	1452	200	MC 279	MC 5 SET TO DIAL .5UV 1000KC 151	
6584260405AN/URM-48	145	200	MC 279	MC 5 SET TO FREQ OF DIAL .5UV	
643600 311AN/URM-48	145	206	MC		
635660 318AN/URM-48	1450	21	MC	3 UV	
643600 415AN/URM-48	1452	21	MC	700 MUV 15KC AT 1KC	
643600 439AN/URM-48	1452	21	MC	2UV OR LESS 15KC AT 1KC	
643600 461I-208		21	MC 27 MC		
643600 462IP-173/U		21	MC 27 MC		
636904A315LP-3	144	212	MC		
636904A316LM-14	244	212	MC		
635660 319AN/URM-48	1450	22	MC	3 UV	
635660 320AN/URM-48	1450	23	MC	3 UV	
6584260407AN/URM-48	145	235	MC1	5 .5 TO 10000	
A 6 401FR-5/U	245	24	MC 55	MC 1	
635660 321AN/URM-48	1450	24	MC	3 UV	
635660 420AN/URM-48	1452	24	MC	00515KC DEV.	
635660 453AN/URM-48	1452	24	MC	00515KC	
635660 469AN/URM-48	145	24	MC	005	
635660 474AN/URM-48	1452	24	MC	005	
635660 480AN/URM-48	1452	24	MC	1KC AF 15KC DEV	
640701B425AN/URM-25	1451	24	MC	00515KC DEV .4-1-2-3.5-5KC AF	
640701B432AN/URM-25	145	24	MC	400C30 PCT 2500MVOUT	
640701B439AN/URM-25	145	24	MC	3 MV	
643600 218AN/URM-48	1451	24	MC	3 MV	
				20 VARIOUS POINTS	

643600	227AN/URM-48	145	24	MC		120UV
643600	228AN/URM-48	145	24	MC		37UV
643600	229AN/URM-48	145	24	MC		3UV
643600	230AN/URM-48	145	24	MC		1UV
643600	416AN/URM-48	1452	24	MC		700 MUV 15KC AT 1KC
643600	420AN/URM-48	145	24	MC		1UV
643600	431AN/URM-48	1452	24	MC		3UV 15KC AT 1 KC
643600	433AN/URM-48	1452	24	MC		1000UV 15KC AT 1KC
643600	435AN/URM-48	1452	24	MC		10UV 15KC AT 1KC
643600	437AN/URM-48	1452	24	MC		10UV 15KC DEV 250 TO 1000
643600	440AN/URM-48	1452	24	MC		2UV OR LESS 15KC AT 1KC
643600	443AN/URM-48	145	24	MC		10UV
643600	454TS-174B/U	243	24	MC		015
643600	241TS-174B/U	245	24	MC		
643600	422AN/URM-48	145	24075	MC		2UV
643600	423AN/URM-48	145	24250	MC		1000UV
643600	242TS-174B/U	245	247	MC		
A 6	302AN/URM-48	245	25	MC 51	MC 1	USED WHEN TEST SET UNAVAIL.
A 6	310AN/URM-48	245	25	MC	10	MOD +- 20KC AT 1000 CPS
635660	322AN/URM-48	1450	25	MC		3 UV
635660	323AN/URM-48	1450	26	MC		3 UV
634395	307SG-92/U	245	263	MC 333	MC 1	
635660	324AN/URM-48	1450	27	MC		3 UV
635660	442AN/URM-48	145	27	MC 28	MC	0051.5UV
635661	328AN/URM-48	1450	27	MC		3 UV
635661	372AN/URM-48	1450	27	MC		0053UV
635661	427AN/URM-48	1452	27	MC		00515KC DEV
643600	417AN/URM-48	1452	27	MC		700 MUV 15KC AT 1KC
643600	441AN/URM-48	1452	27	MC		2UV OR LESS 15KC AT 1KC
643700	309AN/URM-48	145	27	MC		
643700	453TS-174B/U	243	27	MC		015
658427	223AN/URM-48	1452	27	MC 389	MC 5	SET TO TUNING DIAL FREQ
658427	227AN/URM-48	145	27	MC 389	MC	1UV TUNING DIAL FREQ
658427	232AN/URM-48	145	27	MC 389	MC	1UV
658427	269AN/URM-48	145	27	MC		005.4UV
658427	616AN/URM-48	145	27	MC		005
658427	360TS-174/U	245	27	MC 38	MC	005 1MC STEPS OPER. TRANS.
643600	312AN/URM-48	145	274	MC		
643600	456TS-174B/U	243	274	MC		015
643700A	307AN/URM-48	145	2795	MC		
643700	311AN/URM-48	145	279	MC		
6584260	209AN/URM-48	145	279	MC		5 .3UV 4UV 140UV
635660	228AN/URM-48	1450	28	MC		00510UV
635660	233AN/URM-48	1450	28	MC		0051.5UV
635660	316AN/URM-48	1450	28	MC		3 UV
635660	325AN/URM-48	1450	28	MC		3 UV
635660	362AN/URM-48	1450	28	MC 55	MC	3 UV
635660	368AN/URM-48	1450	28	MC		1.5UV
635660	421AN/URM-48	1452	28	MC		00515KC DEV.
635661	238AN/URM-48	1450	28	MC		00530UV
635661	242AN/URM-48	1450	28	MC		0053UV
635661	329AN/URM-48	1450	28	MC		3 UV
635661	362AN/URM-48	1450	28	MC 55	MC	3 UV
635662	362AN/URM-48	1450	28	MC 55	MC	3 UV
643600	455TS-174B/U	243	28	MC		015
643700A	410AN/URM-48	145	28	MC		1.5UV

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643700A412AN/URM-48	1452 28	MC		.70V 15KC AT 1KC
643700A414AN/URM-48	145 28	MC		1.50V
643700 415AN/URM-48	1452 28	MC		700MUV 15KC AT 1KC
643700 439AN/URM-48	1452 28	MC		20V OR LESS 15KC AT 1KC
643700A435AN/URM-48	145 28	MC		
643700A309TS-174B/U	245 28	MC		
643700 4611-208	28	MC 38	MC	
643700 4621P-173/U	28	MC 38	MC	
657225G310TS174/U	245 28	MC 70	MC 1	
658427 319AN/URM-48	145 28	MC 37	MC	005AMPLITUDE TO CAUSE 70UA LI
658427 326AN/URM-48	1452 28	MC		005.50V 15KC DEV 1KC AF
658427 331AN/URM-48	145 28	MC		005
643600 310AN/URM-48	145 286	MC		
A 1A413AN/USM-81	2429 29	MC		MAXBETWEEN 40 DB POINTS
635661 330AN/URM-48	1450 29	MC		3 UV
636904A417AN/URR-23A	214 299	MC		ZERO BEAT
600000 420TS-497/URR	245 30	MC3995	MC 1	
634425 307SG-299/U	144 30	MC	17	
634425 309AN/USM-50	215 30	MC		ADJUST FOR SYMMETRY
635661 331AN/URM-48	1450 30	MC		3 UV
640701B335AN/URM-25	145 30400	MC		LESS THAN 3V OUT
635661 332AN/URM-48	1450 31	MC		3 UV
640701B316AN/URM-25	145 31	MC 32	MC	
640701B426AN/URM-25	1451 3199	MC		400C30 PCT 2500MVOUT
640701B433AN/URM-25	145 3199	MC		3 MV
635661 333AN/URM-48	1450 32	MC		3 UV
543600 452TS-174B/U	243 322	MC		015 30MINUTES DRIFT TEST
643700A434AN/URM-48	145 32960	MC 33040	MC	2UV
643700A435AN/URM-48	145 32860	MC 33140	MC	1MV
658427 376AN/URM-48	145 32955	MC 33045	MC	5 6DB POINTS 90KC BW APPROX
635661 334AN/URM-48	1450 33	MC		3 UV
635661 428AN/URM-48	1452 33	MC		00515KC DEV
635661 458AN/URM-48	1452 33	MC		00515KC
635661 470AN/URM-48	145 33	MC		005
635661 475AN/URM-48	1452 33	MC		005 1KC AF 15KC DEV
635661 481AN/URM-48	1452 33	MC		00515KC DEV .4-1-2-3.5-5KC AF
643700 218AN/URM-48	145 33	MC	20	VARIOUS POINTS
643700A224AN/URM-48	145 33	MC		330UV
643700 227AN/URM-48	145 33	MC		120UV
643700 228AN/URM-48	145 33	MC		37UV
643700 229AN/URM-48	145 33	MC		3UV
643700A230AN/URM-48	145 33	MC		330UV
643700 230AN/URM-48	145 33	MC		1UV
643700A231AN/URM-48	145 33	MC		60UV
643700A232AN/URM-48	145 33	MC		6UV
643700A233AN/URM-48	145 33	MC		1.50V
643700A415AN/URM-48	145 33	MC		1.50V
643700 416AN/URM-48	1452 33	MC		700MUV 15KC AT 1KC
643700A417AN/URM-48	1452 33	MC		.70V 15KC AT 1KC
643700A419AN/URM-48	145 33	MC		1.50V
643700 420AN/URM-48	145 33	MC		1UV
643700 422AN/URM-48	145 33075	MC		2UV
643700 423AN/URM-48	145 33250	MC		1000UV
643700A425AN/URM-48	145 33	MC		.70V

643700A428AN/URM-48	1452 33	MC		.7UV 15KC AT 1KC
643700A430AN/URM-48	1452 33	MC		2UV 15KC AT 1KC
643700 431AN/URM-48	1452 33	MC		3UV 15KC AT 1KC
643700A431AN/URM-48	1452 33	MC		100UV 15KC AT 1KC
643700A432AN/URM-48	145 33	MC		1UV
643700 433AN/URM-48	1452 33	MC		1000UV 15KC AT 1KC
643700 435AN/URM-48	1452 33	MC		
643700A436AN/URM-48	145 33	MC		1UV
643700 437AN/URM-48	1452 33	MC		10UV 15KCDEV AT 250 TO 1000
643700A439AN/URM-48	1452 33	MC		3UV 15KC AT 1KC
643700 440AN/URM-48	1452 33	MC		2UV OR LESS 15KC AT 1KC
643700A441AN/URM-48	1452 33	MC		1MV 15KC AT 1KC
643700A442AN/URM-48	1452 33	MC		10UV 15KC AT 250 TO 5000
643700 443AN/URM-48	145 33	MC		10UV
643700A444AN/URM-48	1452 33	MC		10UV 15KC AT 1KC
643700A446AN/URM-48	145 33	MC		10UV
643700A456AN/URM-48	145 33	MC		
643700 452TS-174B/U	243 332	MC		015 30 MINUTE DRIFT TEST
643700 454TS-174B/U	243 33	MC		015
643700 241TS-174B/U	245 33	MC		
643700 242TS-174B/U	245 337	MC		
643700A243TS-174B/U	245 33	MC		
643700A244TS-174B/U	245 335	MC		
658427 334AN/URM-48	1452 33	MC		APPROX MIDDLE FREQ.15KC DEV
658427 339AN/URM-48	145 33	MC		APPROX MIDDLE FREQ.
658427 356AN/URM-48	145 335	MC		005.5UV AND 160UV
658427 364AN/URM-48	1452 335	MC		00515KC DEV.75UV 10UV11MV 10M
635661 335AN/URM-48	1450 34	MC		3 UV
1 1A325240A	144 35	MC	75 MC	SWEEP RATE 60CPS
635661 336AN/URM-48	1450 35	MC		3 UV
643700 310AN/URM-48	145 356	MC		
635661 337AN/URM-48	1450 36	MC		3 UV
635661 338AN/URM-48	1450 37	MC		3 UV
643700A460AN/URM-48	145 375	MC		
658427 342AN/URM-48	1452 379	MC		005 .5UV 15KC DEV 1KC AF
658427 347AN/URM-48	145 379	MC		005.5UV
635661 339AN/URM-48	1450 38	MC		3 UV
635661 429AN/URM-48	1452 38	MC		00515KC DEV
635661 446AN/URM-48	145 38	MC	39 MC	0051.5UV
635662 343AN/URM-48	1450 38	MC		3 UV
635662 378AN/URM-48	1450 38	MC		005 3UV
635662 434AN/URM-48	1452 38	MC		00515KC DEV
643700A308AN/URM-48	145 387	MC		
643700 312AN/URM-48	145 381	MC		
643700 417AN/URM-48	1452 38	MC		700MUV 15KC AT 1KC
643700A420AN/URM-48	145 38	MC		1.5UV
643700A422AN/URM-48	1452 38	MC		.7UV 15KC AT 1KC
643700A424AN/URM-48	145 38	MC		1.5UV
643700 441AN/URM-48	1452 38	MC		2UV OR LESS 15KC AT 1KC
643700A457AN/URM-48	145 38	MC		
643700A459AN/URM-48	145 385	MC		
643700 456TS-174B/U	243 381	MC		015
643700A310TS-174B/U	245 38	MC		
643800A307AN/URM-48	145 387	MC		
643800 309AN/URM-48	145 38	MC		
643800 453TS-174B/U	243 38	MC		015

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657225E303TS-174/U	245	3885	MC	709	MC	1	
657225E306AN/URM-48	245	3885	MC	709	MC	1	
658427 271AN/URM-48	145	38	MC				005
658427 611AN/URM-48	145	38	MC				005
658428 223AN/URM-48	1452	38	MC	549	MC		SET TO TUNING DIAL FREQ
658428 227AN/URM-48	145	38	MC	549	MC		SET TO DIAL FREQ.
658428 232AN/URM-48	145	38	MC	549	MC		
658428 269AN/URM-48	145	38	MC				005
658428 611AN/URM-48	145	38	MC				005
658428 360TS-174/U	245	38	MC	54	MC		0051MC STEPS OPER. TRANS.
635661 240AN/URM-48	1450	39	MC				00510UV
635661 244AN/URM-48	1450	39	MC				0051.5UV
635661 327AN/URM-48	1450	39	MC				3 UV
635661 340AN/URM-48	1450	39	MC				3 UV
635661 374AN/URM-48	1450	39	MC				0051.5UV
635662 248AN/URM-48	1450	39	MC				00530UV
635662 344AN/URM-48	1450	39	MC				3 UV
643700 455TS-174B/U	243	39	MC				015
643800 311AN/URM-48	145	392	MC				
643800A410AN/URM-48	145	39	MC				1.5UV
643800A412AN/URM-48	1452	39	MC				.7UV 15KC AT 1KC
643800A414AN/URM-48	145	39	MC				1.5UV
643800 415AN/URM-48	1452	39	MC				700MUV 15KC AT 1KC
643800 439AN/URM-48	1452	39	MC				2UV OR LESS 15KC AT 1KC
643800A455AN/URM-48	145	39	MC				
643800A309TS-174B/U	245	39	MC				
643800 461I-208		39	MC	54	MC		
643800 462IP-173/U		39	MC	54	MC		
658428 319AN/URM-48	145	39	MC	53	MC		005AMPLITUDE TO CAUSE 70UA LI
658428 326AN/URM-48	1452	39	MC				0051.3UV 15KC DEV 1KC AF
658428 331AN/URM-48	145	39	MC				Q051.3UV
635662 345AN/URM-48	1450	40	MC				3 UV
635662 346AN/URM-48	1450	41	MC				3 UV
635662 347AN/URM-48	1450	42	MC				3 UV
658430 492	145	42	MC				SW IN CAL POS.
658430 488AN/URM-48		42	MC				005NO AMPLITUDE SHOWN
635662 348AN/URM-48	1450	43	MC				3 UV
643700A451TS-174B/U	245	433	MC				30 MIN DRIFT TEST
635662 349AN/URM-48	1450	44	MC				3 UV
635662 350AN/URM-48	1450	45	MC				3 UV
658428 376AN/URM-48	145	45955	MC	46045	MC	5	APPR. BW 90KC APPR. 6DB PO
635662 351AN/URM-48	1450	46	MC				3 UV
635662 435AN/URM-48	1452	46	MC				00515KC DEV
635662 463AN/URM-48	1452	46	MC				00515KC DEV
635662 471AN/URM-48	145	46	MC				005
635662 476AN/URM-48	1452	46	MC				005 1KC AF 15KC DEV
635662 482AN/URM-48	1452	46	MC				00515KC DEV .4-1-2-3.5-5KC AF
643800 218AN/URM-48	1451	46	MC			20	VARIOUS POINTS
643800 227AN/URM-48	145	46	MC				120UV
643800 228AN/URM-48	145	46	MC				37UV
643800 229AN/URM-48	145	46	MC				3UV
643800 230AN/URM-48	145	46	MC				1UV
643800 241TS-174B/U	245	46	MC				
658428 334AN/URM-48	1452	46	MC				APPROX MIDDLE FREQ. 15KC

658428 339AN/URM-48	145	46	MC			APPROX MID. FREQ.	1.3UV
658428 356AN/URM-48	145	465	MC			0051.3UV-410UV	
458428 364AN/URM-48	1452	465	MC			005	
643800 310AN/URM-48	145	466	MC				
643800 242TS-174B/U	245	467	MC				
643800A435AN/URM-48	145	46860	MC	47140	MC	1MV	
643800A434AN/URM-48	145	46960	MC	47040	MC	2UV	
635662 352AN/URM-48	1450	47	MC			3 UV	
643500A232AN/URM-48	145	47	MC	554	MC	005CHANNEL FREQ.AS DESIRED	32
643500A235AN/URM-48	145	47	MC	554	MC	005CHANNEL FREQ.AS DESIRED	
643500A238AN/URM-48	1452	47	MC	554	MC	005CHANNEL FREQ.AS DESIRED	
643500A418AN/URM-48	1452	47	MC	554	MC	999THROUGH 49 OHM RESISTOR	-J
643500A446AN/URM-48	1452	47	MC	554	MC	99	
643500A450AN/URM-48	1452	47	MC	554	MC	999	
643500A433RT-196/PRC-6		47	MC			00549 OHM OUTPUT LOAD	J3 - GI
643800A221AN/URM-48	145	47	MC			330UV	
643800A227AN/URM-48	145	47	MC			330UV	
643800A228AN/URM-48	145	47	MC			60UV	
643800A229AN/URM-48	145	47	MC			6UV	
643800A230AN/URM-48	145	47	MC			1.5UV	
643800A415AN/URM-48	145	47	MC			1.5UV	
643800 416AN/URM-48	1452	47	MC			700MUV 15KC AT 1KC	
643800A417AN/URM-48	1452	47	MC			.7UV 15KC AT 1KC	
643800A419AN/URM-48	145	47	MC			1.5UV	
643800 420AN/URM-48	145	47	MC			1UV	
643800A425AN/URM-48	145	47	MC			.7UV	
643800A428AN/URM-48	1452	47	MC			.7UV 15KC AT 1KC	
643800A430AN/URM-48	1452	47	MC			2 UV 15KC AT 1KC	
643800 431AN/URM-48	1452	47	MC			3UV 15KC AT 1KC	
643800A431AN/URM-48	1452	47	MC			100UV 15KC AT 1KC	
643800A432AN/URM-48	145	47	MC			1UV	
643800 433AN/URM-48	1452	47	MC			1000UV 15KC AT 1KC	
643800 435AN/URM-48	1452	47	MC			10UV 15KC AT 1KC	
643800A436AN/URM-48	145	47	MC			1UV	
643800 437AN/URM-48	1452	47	MC			10UV 15KC AT 250 TO 1000CP	
643800A439AN/URM-48	1452	47	MC			3UV 15KC AT 1KC	
643800A441AN/URM-48	1452	47	MC			1MV 15KC AT 1KC	
643800A442AN/URM-48	1452	47	MC			10UV 15KC AT 250 TO 5000	
643800 443AN/URM-48	145	47	MC			10UV	
643800A444AN/URM-48	1452	47	MC			10UV 15KC AT 1KC	
643800A446AN/URM-48	145	47	MC			10UV	
643800A456AN/URM-48	145	47	MC				
643800 454TS-174B/U	243	47	MC			015	
643800A240TS-174B/U	245	47	MC				
658430 267AN/URM-48	145	47	MC			00515UV APPROX	
658430 319AN/URM-48	145	47	MC	58	MC	0055 TO 10UV APPROX	
658430 631AN/URM-48	145	47	MC			00515 UV APPROX	
658430 635AN/URM-48	145	47	MC			0051.6 UV APPROX	
658430 401TS-588A/U	1452	47	MC	58	MC	00515KC DEV 1KC AUDIO	
658430 459AN/URM-48	1452	47	MC			00515KC DEV 1KC AUDIO	8UV RI
658430 466AN/URM-48	145	47	MC			005 2UV APPROX	
658430 481AN/URM-48	145	47	MC			005CONNECTED TO 1P-173/U	
658430 482AN/URM-48	1452	47	MC			005NO AMPLITUDE SHOWN	
658430 493	145	47	MC			SW IN CAL POS.	
658430 274TS-588A/U		47	MC			0051.6UV APPROX	
658430 295RT-70/GRC		47	MC	58	MC	005DUMMY ANT CONNECTED	

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658430 317RT-70/GRC	47	MC 58	MC	BEAT NOTE IN HEADSET CAL.P.
643800 422AN/URM-48	145 47075	MC		2UV
643800 423AN/URM-48	145 47250	MC		1000UV
643800A241TS-174B/U	245 475	MC		
635662 353AN/URM-48	1450 48	MC		3 UV
635662 354AN/URM-48	1450 49	MC		3 UV
643800 440AN/URM-48	1452 49	MC		2UV OR LESS 15KC AT 1KC
643500A242AN/URM-25	145 496	MC		005SIGNAL FOR RF STAGE GAIN 1
634479 325TS-452B/U	214 58	MC 62	MC	S CURVE ADJUST
635662 250AN/URM-48	1450 55	MC		00510UV
635662 254AN/URM-48	1450 55	MC		0051.5UV
635662 342AN/URM-48	1450 55	MC		3 UV
635662 355AN/URM-48	1450 50	MC		3 UV
635662 356AN/URM-48	1450 51	MC		3 UV
635662 357AN/URM-48	1450 52	MC		3 UV
635662 358AN/URM-48	1450 53	MC		3 UV
635662 359AN/URM-48	1450 54	MC		3 UV
635662 360AN/URM-48	1450 55	MC		3 UV
635662 380AN/URM-48	1450 55	MC		0051.5UV
635662 436AN/URM-48	1452 54	MC		00515KC DEV
635662 450AN/URM-48	145 54	MC 55	MC	0051.5UV
643500A440TS-174B/U	245 514	MC		005
643500A434RT-196/PRC-6	512	MC		005
643500A435RT-196/PRC-6	554	MC		005
643500A438RT-196/PRC-6	51	MC		005
643800A308AN/URM-48	145 5375	MC		
643800 312AN/URM-48	145 538	MC		
643800 417AN/URM-48	1452 54	MC		700MUV 15KC AT 1KC
643800A420AN/URM-48	145 54	MC		1.5UV
643800A422AN/URM-48	1452 54	MC		.7UV 15KC AT 1KC
643800A424AN/URM-48	145 54	MC		1.5UV
643800 441AN/URM-48	1452 54	MC		2UV OR LESS 15KC AT 1KC
643800A457AN/URM-48	145 54	MC		
643800A459AN/URM-48	145 545	MC		
643800A460AN/URM-48	145 535	MC		
643800 452TS-174B/U	243 592	MC		01530 MINUTES DRIFT TEST
643800 455TS-174B/U	243 55	MC		015
643800 456TS-174B/U	243 538	MC		015
643800A310TS-174B/U	245 54	MC		
643800A451TS-174B/U	245 593	MC		30 MIN DRIFT TEST
657225 401AN/URM-48	245 54	MC		
657225 409AN/URM-48	245 54	MC 709	MC 1	
658428 271AN/URM-48	145 54	MC		005
658428 342AN/URM-48	1452 539	MC		005 15KC DEV 1KC AF 1.3UV
658428 347AN/URM-48	145 539	MC		0051.3UV
658428 614AN/URM-48	145 54	MC		005
658430 264AN/URM-48	145 58	MC		0057UV APPROX SERIES 500 UUF
658430 315AN/URM-48	145 58	MC		00510UV
658430 633AN/URM-48	145 58	MC		0057UV APPROX
658430 637AN/URM-48	145 58	MC		005.8 UV APPROX
658430 407TS-588A/U	145 52	MC 58	MC	0051UV
658430 409TS-588A/U	145 52	MC 58	MC	0053UV 80UV
658430 411TS-588A/U	145 5795	MC 5805	MC	APPROX - 8 TO 16 UV
658430 418TS-588A/U	145 52	MC		00510UV 15KC DEV 1KC AUDIO

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658430 424TS-588A/U	1452 52	MC		00510UV 15KC DEV
658430 455AN/URM-48	1452 5795	MC	5805 MC	APPR. 17010UV 15KC DEV 1KC.
658430 460AN/URM-48	1452 52	MC		00515KC DEV 1KC AUDIO 8UV RI
658430 461AN/URM-48	1452 58	MC		00515KC DEV 1KC AUDIO 8UV RI
658430 467AN/URM-48	145 52	MC		005 2UV APPROX
658430 468AN/URM-48	145 58	MC		005 2UV APPROX
658430 477AN/URM-48	1452 52	MC		00515KC DEV
658430 494	145 53	MC		SW IN CAL POS.
658430 271TS-588A/U	58	MC		0058UV APPROX AT ANTENNA CONN
658430 277TS-588A/U	58	MC		005 1UV 15KC DEV 1KC AUDIO
658430 282TS-585A/U	58	MC		00515KC DEV 1KC AUDIO
658430 288TS-588A/U	58	MC		00515KC DEV 1KC AUDIO
658430 489AN/URM-48	53	MC		005NO AMPLITUDE SHOWN
634479 316TS-497A/URR	144 60	MC		
634479 319TS-452B/U	144 60	MC		5 10MC SWEEP WIDTH
634479 323TS-497A/URR	144 60	MC		400C MOD
653400A441AN/URM-25	1451 66	MC		3 BANDWIDTH 30KC MAX AT 10 M'
600000 424AN/URM-70	245 99	MC400	MC 1	MOD 24KC AT 85KC DEV
640701R321AN/URM-25	145 95	MC		LESS THAN 3V OUT
A 1A329240A	145 1025	MC		BW LESS THAN 8MC AT 3DB
A 2A309SG-66/ARM-5	145 131	MC		30 PERCENT MOD 1000UV OUT
A 2A409SG-66/ARM-5	145 131	MC		LESS THAN 5 UV
1 14C307HP 608-D	145 110	MC		300MV
A 14C407HP 608-D	145 118	MC148	MC	200MV
600000 217AN/URM-70	155216175	MC		TO RCVR INPUT
600000 222AN/RUM-70	155216175	MC		APPLY RCVR ANT CHECK FREQ I
600000 313AN/URM-81	245 112375	MC		
600000 413AN/URM-70	155210025	MC965	MC	PG 445 DISTORTION TEST PG
600000 423AN/URM-80	245 10025	MC22590	MC 1	
600000 427SG-92/U	245 10025	MC3995	MC 1	60CPSSWEEP AT 25MC WIDTH
647800 303TS-684/URM-30245	120	MC	240 MC 1	
A 14C405HP 608-D	145 228	MC258	MC	200MV
A 14C410HP 608-D	1451230	MC255	MC	10UV 30PERCENT AT 1KC
A 14C403HP 608-D	145 250	MC		200MV
A 12 404AN/GRM/4	145 3293	MC335	MC	FINAL TEST
636904A306608-B	145 350	MC		XMTR SECTION
A 1A332650B	216 1090KMC			1 BW 6 TO 8 MC AT 3DB
A 1A414AN/USM-81	2469 1030KMC			1 RCVR CTR FREQ
A 1A421650B	246 1090KMC			1 FREQ TEST XMTR
A 1A330240A	145 1027KMC	1033KMC		1 BW 6 TO 8 MC AT 3DB
A 1A331N410A	216 1090KMC			1 BW 6 TO 8 MC AT 3DB
A 1A334612	1539 1030KMC			A/C ADJUSTMENT 50 PERCENT
A 1A345612	146 1030KMC			SIG INPUT -76DBM
634395 301TS-148/UP	245 9080KMC			
634425 404AN/MPQ-4A	2463 16 KMC		1	
634479 417TS-147B/UP	1163 9375KMC			-84DBM MAX

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APPENDIX C

PHASE TWO SUMMARY SHEETS

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APPENDIX C

PHASE TWO SUMMARY SHEETS

602500 AM1805/FRC-SS R.F. AMPLIFIER 12 159 T031R2-2FRC-412

MEASUREMENT RANGES

100AM1805/FRC-SS

	112 208	V250	V 2	3 PHASE
101	132 50	KVA	2	
102	142 50	C 60	C 2	
103	211 435	V 12	KV 5	
104	212 63	V250	V 5	
105	271 10	0 1	MO 10	
106	245 4	MC 265	MC 1	
107	235 30	KW		PEAK ENVELOPE
108	143 100	C 6	KC	

TEST EQUIPMENT

602500 200AM1805/FRC-SS

ELECTRON TUBE TEST SET

685665 201TV-7/U

AUDIO OSCILLATOR

603810 202TS-202A/U

VTVM

614850 203TS-505/U

DISTORTION ANALYZER

204WE X-75153A

WESTERN ELECTRIC

VTVM

696825 205MF-20A/U

HUMIDITY-TEMPERATURE SET 12 157 T012M3-2AMQ7-2

625700 AN/AMQ-7

MEASUREMENT RANGES

625700 100AN/AMQ-7

101	112 115	V	10
102	142 400	C	5
103	132 35	VA	10
104	111 28	V	10
105	131 300	W	10
106	211 15	V115	V 5
107	271 28	0 20	W010

TEST EQUIPMENT

625700 200AN/AMQ-7

DECADE RESISTOR

201TS-894/11

696825 202MF-20/U

VTVM

614850 203TS-605/11

VTVM

204AN/PDSM-6

MULTIMETER

628960 2050S-8A/U

OSCILLOSCOPE

628704 2062M-21A/11

OHMMETER

207ML-244

PSYCHROMETER

685665 208TV-7/U

TURF TESTER

1012M1-2AMR1-2

10 158

RADIOSONDE RECEPTOR

AN/AMR-1A

658201

MEASUREMENT RANGES

658201 100AN/AMR-1A

101	112 1035	V1265	V10
102	132 230	W	10
103	142 380	C420	C 5
104	111 24	V 20	V10
105	131 35		10
106	211 1	V350	V 5
107	212 63	V480	V 5
108	271 1	0 10	M10
109	267 10	115 15	V5 5
110	247 20	C550	C 5
111	245 30	MC411	MC 5

TEST EQUIPMENT

658201 200AN/AMR-1A

MULTIMETER

201AN/PCM-6

TUBE TESTER

685665 202TV-7/11

FREQUENCY CALIBRATOR

203FR-93/11

OSCILLOSCOPE

204AN/11CM-24

622920	205AN/110M-15	PULSE GENERATOR
	206AN/115M-66	SIGNAL GENERATOR
	207TS-323/110	FREQUENCY METER
614850	208TS-505/11	VTVM

12 159 T012M4-7AMT6-11

RADIOSONDE

AN/AMT-6D

658200

MEASUREMENT RANGES

100AN/AMT-6D

111 135 V 5

111 15 V 5

111 75 V 5

121 35 MA 5

121 100 MA 5

121 400 MA 5

NOT GIVEN

NOT GIVEN

NOT GIVEN

247 25 C 500 C5

217 14 KV10

MINIMUM PEAK

237 140 W

245 207 WC409 WC 5

TEST EQUIPMENT-NONE LISTED

AN/AMT-6D

		RUMFDS		RATIO SET		MEASUREMENT RANGES		TEST EQUIPMENT	
						400 CPS 3 PHASE			
R	1	AN/APC-61							
	1	101	112	115	V				
	1	102	132	200	VA				
	1	103	111	275	V				
	1	104	121	14	A	90	A		
	1	105	145	5	WC1999	VC			
	1	106	245	171	WC1999	MC			
	1	107	143	70	C	7	XC		
	1	108	211	2	V430	V			
	1	100	221	10	MA120	MA			
R	1	110	111	2	C	30	MO		
	1	111	225	7	VW 20	W			
	1	112	222	50	WM150	WW			
	1	113	115	3	UV	5	V		
	1	200							
	1	201AN/11SM-44						PF GENERATOR	
	1	202AN/11RM-25						PF GENERATOR	

R	1	209TS-3820/U	AF GENERATOR
Q	1	2040S-8C/U	SCOPE
Q	1	204TS-605/U	VTVM
Q	1	206AN/DSM-6	MULTIMETER
R	1	207MF/60/U	AC VOLTMETER
Q	1	208AN/IRM-43A	RF WATTMETER
R	1	209TS-323/UR	FREQUENCY METER
R	1	210TS-685R/U	AF WATTMETER
R	1	211LM-14	LOW FREQUENCY METER
R	1	212AN/IRM-14	MIC SIMULATOR
R	1	213DA-79/U	DUMMY LOAD
Q	1	214MK-20/UP	PRESSURIZING UNIT
R	1	215SCHEADE 3715	AIR GAUGE
Q	1	216COLLINS 51J	RECEIVER
Q	1	217HFWLFTT-PACKA	COUNTER 4250
B	1	218HFWLFTT-PACKA	FREQUENCY CONVERTER 100-200 MC
R	1	219HFWLFTT-PACKA	SCOPE 540A

11556 TW11-1518

11556

RADAR SET

634695 AN/SPN-33

MEASUREMENT RANGES
50/60 CPS 117V NOMINAL

634695 100AN/SPN-33

101	212 111	V123	V 25
102	211 265	V 295	V 25
103	211 1	V 12	KV 25
104	212 24	V 65	KV 5
105	271 25	2 20	W010
106	142 50	C 60	C 1
107	242 60	C 15	KC 1
108	245 30	WC 10	KWC 1
109	267 25	US250	US 1

TEST EQUIPMENT

634695 200AN/FPN-33

THIRF TEST SET

685665 201TV-7/U

MULTIMETER

202TCS-3529/U

AUDIO OSCILLATOR

602810 203TCS-382A/U

XTAL TEST SET

612250 204TCS-2680/U

VTVM

614850 205TCS-505/U

PULSE GENERATOR

633830 206AN/10PM-15

SWEEP GENERATOR	2075G-02/U
SPECTRUM ANALYZER	667630 208TS-148/U/P
FCHO BOX	209TS-488/U/P
TURF SOCKET ADAPTER KIT	210MX-1258/U
ELECTRON TUBE TEST SET	685660 211TV-2/U
OSCILLOSCOPE	628927 212AN/USM-40
TEST SET	213TS-147D/U/P

73159 Y031R2-2FRR40-6

RADIO RECEIVING SET

AN/FRR40+41

635601

MEASUREMENT RANGES

635601 100AN/FRR40 + 41

101	112	115	V	10
102	142	60	C	5
103	211	5	V355	V 5
104	212	09	V 25	V 5
105	142	50	C100060 KC	5
106	145	455	KC 215	MC 5

TEST EQUIPMENT

635601 200AN/FRR40 + 41

MULTIMETER

VTVM

SIGNAL GENERATOR

AUDIO OSCILLATOR

VTVM

FREQUENCY METER

SPECTRUM ANALYZER

201AN/DCM-6

202ME-6/U

665020 203AN/IRM-25

603810 204TS-282/U

614850 205TS-505/U

206AN/ISM-26

207TS-615/U

1031P1-2GPA23-2

RADAR COMPUTER-TRACKING

AN/GPA-23

634501

MEASUREMENT RANGES

634501 100AN/GPA-23

60 CPS 3 PHASE

101	112 120	V200	V10	10
102	111 20	V		
103	212 02	V400	V 5	0MS
104	242 60	C 25	KC 5	
105	211 02	V 65	KV 5	
106	247 200	C400	C 5	
107	217 4	V120	V 5	PEAK-TO-PEAK
108	267 1	US200	US 5	
109	271 1	C 20	W010	

TEST EQUIPMENT

634501 200AN/GPA-23

WITH 52/540 + 52/540 DRE-AMDS

201TEKTRONIX 531	SYNCHROSCOPE
202TC-375A/II	VTVM
203HD600C	AC VTVM
204SIMSON 260	MULTIMETER
205SLIFE 800	DIFFERENTIAL VOLTAGES
206TEKTRONIX 180	TIME-BASE GENERATOR

207SR1 FSHAKE	ELECTROSTATIC VOLTAGE-SENSITIVE RESEARCH INSTRUMENT
209MD 6234	ELECTRONIC COUNTER
209TC-1820	AUDIO OSCILLATOR
210TS1923/CPA-22	COMPUTER TEST SET

657303 AN/GRA-30 TRANSMITTER CONTROL GRP 61561 1031R2-2GRA30-2

MEASUREMENT RANGES

657303 100AN/GRA-30

101	112 120	V	10
102	142 60	C	5
103	122 20	W	10
104	111 48	V	10
105	212 18	V120	V10
106	211 2	V150	V 5
107	271 1	C 1	MO10
108	217 16	V 60	V 5
109	143 537	C966	C 5

TEST EQUIPMENT

657303 200AN/GRA-30

TEST SET ELECTRON TUBE

685665 201TV-7B/U

614850 202TS-5050/U

VTVM

203WD205AG

SIGNAL GENERATOR AUDIO

204WD 523R

ELECTRONIC COUNTER

205TEXTRONIX 545

OSCILLOSCOPE

206AN/DMS-A

MULTIMETER

59 PRELIMINARY TEST

MEASUREMENT RANGES
50-60 CPS SINGLE PHASE
DC VOLTAGE MEASUREMENTS
DC RESISTANCE MEASUREMENTS
AC VOLTAGE MEASUREMENTS
DC CURRENT MEASUREMENTS

RADIO VET

AN/GSC-50

2

2 100AN/GSC-50

2

112 115 V
211 02 875 V
111 4 0150 MO
212 26 V11⁴ V
145 75 MC 1850 GC
1452 75 MC 60 MC
221 10 UA 35 UA
142 900 C 20 KC
1422 625 KC

TEST EQUIPMENT

AUDIO VOLTMETER
VACUUM TUBE VOLTMETER
FM AUDIO OSCILLATOR
RF SIGNAL GENERATOR
FREQUENCY METER
AUDIO OSCILLATOR

2 200AN/GSC-50

2

2 201MF-203/11

2

2 202VF-26B/11

2

2 203WAVEFORMS 52

2

2 204AN/11RM-64

2

2 205AN/11SM-26

2

2 206SG-15/PCM

2

R	2	2075G-155/11	RF SIGNAL GENERATOR
R	2	208BOMONTON 240A	OF SWEEP GENERATOR
R	2	209HD 420A	CRYSTAL DETECTOR
R	2	210IM-97/USM-37	STANDING WAVE INDICATOR
R	2	211USM-81	OSCILLOSCOPE
R	2	212WESTON 430	DC VOLTMETER 10CT
R	2	213CN-318/G	VARIABLE ATTENUATOR
R	2	214CG-718/11	CABLE
R	2	215BLOWER (AIR)	300CFM/MIN
R	2	214TS-352/11	MULTIMETER

FFD, TFLCOM LAB

		MEASUREMENT RANGES		60 COS 250K SINGLE PHASE	
R	Q	AN/GSC-44	2000 SET		
				112 115	V
R	3	100AN/GRC-66		1452 62	VC 78 MC
R	3	101		111 26	C 22 W
R	3	102		212 26	MV115 V
R	3	103		142 50	C 55 MC20
R	3	104		112 1	MV 12 V
R	3	105		211 10	MV240 V
R	3	106		222 5	A 5 A
R	3	107		272 600	C 15 C
R	3	108		225 1	MV 2 W
R	3	109		145 70	MC 2050 GC
R	3	110		245 568	MC 2400 GC
R	3	111		115 1	MV 29 V
R	3	112		221 22	11A 50 UA

TEST EQUIPMENT

FREQUENCY METER

R	3	200	
R	3	201FR-67/U	

R	3	202ME-20	VTW
R	3	203ME-44/11	VTW
R	3	204TS-550/ET	TRANSMISSION MEASURING SET
R	3	205MS-46	OSCILLOSCOPE
R	3	206TS-420/11	VTW
R	3	207TS-722/11	SPECTRUM ANALYZER
R	3	208AN/112M-08	WATT METER
R	3	209TS-419/11	SIGNAL GENERATOR
R	3	210TS-402/11	SIGNAL GENERATOR
R	3	211AN/115M-46	SIGNAL GENERATOR
R	3	212IM-02/11	STANDING WAVE IND.
R	3	213IM-07	STANDING WAVE IND.
R	3	214ME-202/11	VTW
R	3	215ME-204/11	VTW
R	3	216AN/00M-10	TEST OSCILLATOR
R	3	217TS-50E	VTW
R	3	218ME-2/11	VTW
R	3	219HEWLETT-PACKA	OSCILLOSCOPE MODEL 1670
R	3	220HEWLETT-PACKA	OSCILLOSCOPE MODEL 7660
R	3	221FREQUENCY STD	WAVELENGTH 1722-4
R	3	222HEWLETT-PACKA	OSCILLOSCOPE 4775

P	2	222MICROLAB AF-1	ATTENUATOR AF-10
P	2	224MICROLAB MOD B	RECEIVER
Q	2	225MICROLAB RS	OUT-OF-HEAD
Q	2	226HEWLETT-DACVA	VIDEO OSCILLATOR 650A
P	2	227HEWLETT DACVA	OSCILLOSCOPE 120A
P	2	228KAY ELECT.	SPEED GENERATOR MOD 1E
P	2	229VARION CO 60	VISCOMETER C-501A
P	2	230HEWLETT DACVA	DETECTOR 420B
Q	2	231TEKTRONIX	COUPE WAVE GENERATOR 105
P	2	232GENERAL RADIO	50 OHM LOAD
P	2	233KAY LAB	NOISE GENERATOR, MEGAHODE SENIOR

GEN DYNAMICS

RADIO SET

4 AN/GRC-106

4

MEASUREMENT RANGES

33 AMPS

4 100AN/GRC-106

4

V

30

V

111

24

MC

245

1

MC

145

175

MC

20000

MC

211

15

V

2

KV

235

250

W

DEF

221

25

MA

50

MA

215

45

WV

20

V

115

2

1W/400

10V

212

2

V100

V

TEST EQUIPMENT

4 200AN/GRC-106

4

ATTENUATOR CONNECTOR T 335R

4 201HEWLETT PACKA

4

COUNTED 5260

4 202HEWLETT PACKA

4

FREQUENCY CONVERTER 325A

4 203HEWLETT PACKA

4

AUDIO GENERATOR 20000

4 204HEWLETT PACKA

4

SIGNAL GENERATOR 606A

4 205HEWLETT PACKA

4

50 OHM LOAD

4 206100W MON 82

4

Q	4	PORTABLETT 620	MULTIMETER
R	4	DOUGHERLETT PACKA	AUDIO OSCILLATOR 2000B
R	4	210TEKTRONIX 545	OSCILLOSCOPE
R	4	210PANORAMIC 700	PARALLELIZED
R	4	210POWER CHODIV	SVPC
R	4	210POWER CHODIV	100VDC
R	4	210BRIEF + JASO	SELECTIVE MULTIMETER 2005
R	4	215BALANTINE	VTVM 314
R	4	216CANTON 010	DE VTVM
R	4	217DEHETT DANCY	DE VTVM 4100

657302 AN/MRR-6

31560

RECEIVING SET, RADIO

TO31R2-MRR6-2

MEASUREMENT RANGES

657302 100AN/MRR-6

101	112 120	V240	V10
102	142 60	C	5
103	111 15	V	5
104	132 5	KW	10

TEST EQUIPMENT

657302 200AN/MRR-6

MILLIMETER

200AN/DCM-6

TIME TESTED

657302 200TV-7/11

657300 AN/MRT-7 TRANSMITTING SET RADIO 01550 TC31R2-2PRT7-2

MEASUREMENT RANGES

657300 100AN/MRT-7

101	112 120	V240	V 5
102	142 60	C	
103	132 5	KW	
104	235 50	W 75	W10
105	245 15	MC 15	MC 5

657300 200AN/MRT-7

TEST EQUIPMENT - NONE LISTED

THIS IS SET DESCRIPTION

613200 AN/DRS4 DETECTING SET, MINE 9 53 TM5-9541

MEASUREMENT RANGES

A AND B BATTERY

613200 100AN/DRS4

101	211	11	V135	V10
102	271	45	27	M010
103	211	25	V135	V 5
104	245	380	MC400	MC 25
105	243	950	C 1050	KC 25
106	212	8	V 40	V 25

613200 200AN/DRS4

TEST EQUIPMENT

201HD 205AG AUDIO SIGNAL GENERATOR

202BALLANTINE 30 AC VTVM

203DUMONT 2044 OSCILLOSCOPE

204ERFEN 2445R 1 KC BANDPASS FILTER

205LAVOIE 1052W FREQUENCY METER

206HD 410R VTVM

KATHLEEN CO.

MULTIPLIER SETS

MEASUREMENT RANGES
47-63 CPS SINGLE PHASE

R	5	100AN/TCC-46 + 47	112 100	V121	V
R	5	101			
R	5	102	132 257	W484	N
R	5	103	211 2	V 32	V
R	5	104	267 80	45 5	115
R	5	105	247 1	KC 4608 MC	
R	5	106	212 45	WV100	V
R	5	107	111 2	0300	0

TEST EQUIPMENT

R	5	200AN/TCC-46+47			
R	5	201AN/115M-24		FREQUENCY METER	
R	5	202AN/115M-105		MULTIMETER	
R	5	203TS/2528/11		MULTIMETER	
R	5	204ME-26/U		MULTIMETER	
R	5	205AN/115M-R1		OSCILLOSCOPE	
R	5	206TS-402/11		X10 ATTENUATOR PRORF	
R	5	207TEKTRONIX 534		DUAL TRACE PLUG-IN UNIT	
R	5	208SG-71/FCC		SIGNAL GENERATOR	

A	5	209TS-559A/FT	TRANSMISSION MEASURING SET
A	5	210TF-123	TOOLS
A	5	211MF-20R/II	VOLTMETER
A	5	212TS-1323(XC-3)	TELEPHONE TEST SET /PT
B	5	213TEKTRONIX 545	OSCILLOSCOPE
B	5	214TEKTRONIX CA	PLUG-IN UNIT
A	5	215HEWLETT-PACKA	AUDIO OSCILLATOR 200CD
B	5	216HEWLETT-PACKA	ACVTM 400D
B	5	218BNC-T	COAX CONNECTOR
B	5	219AN/TCC44+47	EXTENDER PANFL
B	5	220AN/TCC44+47	EXTENSION CABLE

657301 AN/TRC-66 RADIO SET 12 260 T031R5-2TRC66-2

657301 AN/TRC-66 RADIO SET 12 260 T031R5-2TRC66-2

MEASUREMENT RANGES

3 PHASE

101	112	120	V208	5	3
102	142	400	C	5	5
103	172	475	A 525	A 5	5
104	192	7715	KW	10	10
105	211	1	V 75	KV10	10
106	212	236	MV208	V 5	5
107	245	97	MC 135	KMC 5	5
108	235	10	KW	10	10
109	271	1	0 108	MO10	10
110	242	500	C300	KC	10

TEST EQUIPMENT

657301 200AN/TRC-66

VTVM

628314 201MF-26A/U

MULTIMETER

202AN/PSM-6

VTVM

696R25 203MF30A/U

AUDIO OSCILLATOR

204HP200CD

BOGTON RADIO CORP

205240A	SWEEP GENERATOR
206AN/115M-44A/U	SIGNAL GENERATOR
207AN/115M-26A	FREQUENCY COUNTER
208HP525B	FREQUENCY CONVERTER
628927 209AN/115M-50B	OSCILLOSCOPE
21030-C	VARIABLE ATTENUATOR
211AN/DRM-17	MEGACYCLE METER
212HP712R	POWER SUPPLY
213HP721A	BIAS SUPPLY
214490D523601	TRANSPONDER
215341	STANDARD AC VOLTMETER
216370	STANDARD AC AMMETER
217HP626A	SHF SIGNAL GENERATOR
218HPG382A	VARIABLE ATTENUATOR
219HPG010A	WAVEGUIDE TERMINATION
220HPP010A	WAVEGUIDE TERMINATION
221HDP810R	WAVEGUIDE SLOTTED SEC.
222HPP010R	WAVEGUIDE SLOTTED SEC.
223HP0415R	SWR INDICATOR
224HDP042A	FREQUENCY METER
225HDP6752C	DIRECTIONAL COUPLER

226HPP752D	DIRECTIONAL COUPLER	
227HP809B	PROBE CARRIAGE	
228HP444A	UNTUNED BROADBAND PROBE	
229HP447B	THERMISTOR MOUNT	
230HPP487R	WG THERMISTOR MOUNT	
231HPG487R	WG THERMISTOR MOUNT	
232HPG370	WG ATTENUATOR	
233POLORAD RM-T	MICROWAVE RECEIVER	
234HPP421A	WG XTAL MOUNT	
235A1L70R-40	NOISE GENERATOR	AIRBORNE INSTRUMENT LAB CO.
236A1L71	POWER SUPPLY FOR 235	AIRBORNE INSTRUMENT LAB CO.
2370A-12402/1	NOISE GENERATOR	MARCONI INSTRUMENT
238395A	WIDEBAND AMPLIFIER	INSTRUMENT FOR INDUSTRY
239MC-19/SB-043-	CALORIMETRIC WATTMETER CUBIC CORP	
240HP684A	SWEEP OSCILLATOR	
241AN/IRM-52	SIGNAL GENERATOR	
242HP459A	COAXIAL PROBE N TYPE	
243HP430C	MICROWAVE PWR METER	
244AN/IDM-24	SPECTRUM ANALYZER	
245MX554/1J	TERMINATION RESISTOR	GREMOR MFG CO.
246613	WAVEGUIDE ADAPTOR	NARDA MICROWAVE CO

WR XTAL DETECTOR

247HP420R

651200 100AN/VRC-24

6 141

RADIO SET

AN/TRC-68

AN/VRC-24

MEASUREMENT RANGES

651200 100AN/VRC-24

AN/TRC-68

101	212 103	V253	V20	50/60 CPS 300 WATTS
102	211 22	V 30	V20	26.4 V NOMINAL
103	211 02	300	V 25	
104	212 042	V253	V 1	
105	245 5	MC1999	MC 1	
106	243 50	G 10	KC	
107	235 16	W		MINIMUM

TEST EQUIPMENT

651200 200AN/VRC-24

AN/TRC-68

MULTIMETER

201TS-352/11

ELECTRON TUBE TEST SET

685665 202TV-711

ELECTRON TUBE TEST SET

685660 203TV-2/11

AUDIO OSCILLATOR

603810 204TS-382A/11

SIGNAL GENERATOR

664870 205TS-497A/11RR

FREQUENCY METER

206AN/11RM-79

616R31	207AN/IRM-20	FREQUENCY METER
	208AN/IRM-21	FREQUENCY METER
602640	200TS-723A/11	SPECTRUM ANALYZER
616R20	210AN/IRM-22	FREQUENCY METER
628027	211AN/ISM-50	OSCILLOSCOPE
	212AN/IRM-43A	RF WATTMETER
	212AN/IRM-25D	RF SIGNAL GENERATOR
696825	214ME-20B/11	ELECTRONIC VOLTMETER
	215AN/ISM-26	FREQUENCY METER
	216CN-31B/11	VARIABLE ATTENUATOR
	217HD 420A	LINEAR DETECTOR
628314	218ME-26A/11	MILITIMETER
	210CN-77/11CW	TRANSFER OSCILLATOR
	220CN-16A/11	VARIABLE AUTOTRANSFORMER

41960 TM11-6940-205-15

TPAJNER RADAR

AN/MLT-72

634500

MEASUREMENT RANGES

634500 100AN/MLT-72

500 WATTS

V10

V120

212 105

101

C10

C460

242 50

102

V10

V 693

212 567

103

NEGATIVE AND POSITIVE

V 25

V300

211 0

104

W10

0 10

271 30

105

V 25

V520

211 8

106

V10

V115

212 63

107

PEAK TO PEAK ON SCOPE

V10

V 45

217 13

108

PEAK TO PEAK ON SCOPE

V10

V 42

213 15

109

KHC 1

85 KMC

246 85

110

TEST EQUIPMENT

15 MC VERTICAL BW

634500 200AN/MLT-72

OSCILLOSCOPE

201TEKTRONIX 514

MULTIMETER

202AN/DSM-4

WAVEMETER-FREQ METER

203FR-19(XW)/11

VTVM

204TS-505/11

PHASE SHIFT NETWORK

205POLARON MK-1

27441CVXK TV-30/ TIME TESTED

AVCO MFG CORP

11250

RADIO SET

AM/VRC-12

6

MEASUREMENT RANGES

INPUT VOLTAGE

INPUT CURRENT

FM-1KC-10TH 10KC

RF AMPLITUDE

5.65 MC

AUDIO FREQUENCY

AF AMPLITUDE

AC VOLTAGE

RESISTANCE

DC CURRENT

TEST EQUIPMENT

VTVM 4000

VTVM 4100

HETERODYNE VOLTMETER 2002

RF SIGNAL GENERATOR IF1066/1

AF SIGNAL GENERATOR 205A

6 200AM/VRC-12

6 201HEWLETT-PACKA

6 202HEWLETT-PACKA

6 203RIEFL-KJAFR

6 204MARCONI INST

6 205HEWLETT-PACKA

UNCLASSIFIED

9 A 2000/0000-4

9

603300 CU-547/GR ANTENNA COUPLER 3 159 T031R1-2GR-142

MEASUREMENT RANGES

603300 100CII-547/GR

101 111 0 V
102 121 0 A

SPECIFICATIONS

603300 200CII-547/GR

201 245 225 MC400 MC 25
202 275 50 0 10
203 295 0 4200 410

NO TEST INFO AVAILABLE
FOR THIS DOCUMENT

63059 TM11-6665-200-35

63059

RADIACMETER

IM-108/00

634675

MEASUREMENT RANGES

634675 100IM-108/00

111 13 V

101

111 104 V

102

TEST EQUIPMENT

634675 200IM-108/00

MULTIMETER

628139 201AN/URM-105

RADIAC CALIBRATOR

202AN/IDM-1

7031R2-4-127-9

TRANSCEIVER

635600 KWT-6

MEASUREMENT RANGES

635600 100KWT-6

NO INFORMATION

101

INCOMPLETE INFO

102

INCOMPLETE INFO

103

244 207 KC457 KC 5

104

245 10 MC 24 MC 5

105

INFORMATION INCOMPLETE

635600 200KWT-6

MULTIMETER

201AN/PSM-4

VTVM

694825 202MF-30A/11

VTVM

628314 203ME-26A/11

RF PRORF

204HP455A

VTVM

205RA/LANTINE 31

AUDIO OSCILLATOR

603810 206TS-382/11

RF SIGNAL GENERATOR

645028 207AN/IRM-25

MULTIMETER

208MF-6/11

DECIFL METER

209TS-300/11

RECEIVED

210R-307A/11R2

657304 T-265/FRC-10 RADIO TRANSMITTER 62959 T031R2-3FRC10-26

MEASUREMENT RANGES

657304 100T-265/FRC-10

101	112 216	V244	V 5
102	112 113	V117	V 5
103	211 435	V 42	KV 5
104	212 14	V 105	V

TEST EQUIPMENT

657304 200T-265/FRC-10

614850 201TS-505/11 VTVM

202AN/PCW-A MULTIMETER

203WESTON 433 AC VOLTMETER

678925 204AN/11SM-32 FREQUENCY METER

205TS-399/11 DECIBEL METER

Report No. 2535

APPENDIX D

PHASE TWO VOLTAGE SHEETS

APPENDIX D

PHASE TWO VOLTAGE SHEETS

1091R2-2FRC-412

12 159

R.F. AMPLIFIER

AM1805/FRC-SS

602500

V 2 3 PHASE

V 2

V250

112 208

101

KV 5

V 12

211 435

104

V 5

V250

212 63

105

T012M3-2AM07-2

12 157

HUMIDITY-TEMPERATURE SET

AM/ANG-7

625700

101	112 115	V	10
104	111 28	V	10
106	211 15	V115	V 5

7012M1-2AMR1-2

10 158

RADIOSONDE RECEPTOR

AN/AMR-1A

698201

101	112 1035	V1265	V10
104	111 24	V 29	V10
106	211 1	V350	V 5
107	212 63	V480	V 5

658200 AN/ANT-40 RADIOSONDE 12 159 T012MA-2AMT6-11

101	111 135	V	5
102	111 15	V	5
103	111 75	V	5
111	217	14	KV10

		BUREPS					
B	1	AM/ARC-91	RADIO SET			400 CPS 3 PHASE	
8	1	101	112 115	V			
8	1	103	111 275	V			
8	1	108	211 2	V430	V		
8	1	110	111 2	0 30	MO		
8	1	113	115 3	UV 5	V		

Figure 6, Appendix D

694695	AN/FPM-33	RADAR SET	11550	TM11-1590
101		212 111	V 25	50/60 CPS 117V NOMINAL
102		211 265	V 295	V 25
103		211 1	V 12	KV 25
104		212 24	V 65	KV 5

639401 AM/FRR40+41 RADIO RECEIVING SET 79159 T031R2-2FMR40-6

101	112	115	V	10
103	211	5	V355	V 5
104	213	09	V 25	V 5

T031P1-2GPA23-2

RADAR COMPUTER-TRACKING

AN/GPA-23

634501

101	112	120	V208	V10	60 CPS 3 PHASE
102	111	28	V	10	
103	212	02	V490	V 5	RMS
105	211	02	V 65	KV 5	
107	217	4	V130	V 5	PEAK-TO-PEAK

657303 AN/GRA-10

61561

TRANSMITTER CONTROL GRP

1031R2-2GRA30-2

101	112 120	V	10
104	111 48	V	10
105	212 18	V120	V10
106	211 2	V150	V 5
108	217 16	V 60	V 5

59 PRELIMINARY TM

RADIO SET

8 2 AN/GRC-50

50-60 CPS SINGLE PHASE
DC VOLTAGE MEASUREMENTS
DC RESISTANCE MEASUREMENTS
AC VOLTAGE MEASUREMENTS

112 115 V
211 02 875 V
111 4 0150 MO
212 26 V115 V

8 2 101
8 2 102
8 2 103
8 2 104

FED. TELECOM LAB

RADIO SET

AN/GRC-66

3

60 CPS 250W SINGLE PHASE

8	3	101	112	115	V		
8	3	103	111	06	0	22	MO
8	3	104	213	26	MV115		V
8	3	106	113	1	MV	12	V
8	3	107	211	10	MV840		V
8	3	113	115	1	MV	29	V

GEN DYNAMICS

B	4	AN/GRC-106	RADIO SET		33 AMPS
0	4	101	111	24	V 30
0	4	104	211	15	V 2 KV
0	4	107	215	45	MV 30 V
0	4	108	115	3	UV400 UV
0	4	109	212	2	V130 V

T031R2-2MRR6-2

31560

RECEIVING SET, RADIO

AN/MRR-6

657302

101	112 120	V240	V10
103	111 15	V	5

TO31R2-2MRT7-2

91559

TRANSMITTING SET RADIO

V 5

V240

112 120

AN/MRT-7

657300

101

TMS-9541

9 53

DETECTING SET-MINE

AN/PRS4

613200

101	211	11	V135	V10	A AND B BATTERY
103	211	25	V135	V 5	
106	212	8	V 40	V 25	

RAYTHEON CO.

8 5 AN/TCC-46 + 47 MULTIPLEXER SETS

47-63 CPS SINGLE PHASE

8	5	101	112	109	V121	V
8	5	103	211	2	V 32	V
8	5	106	212	45	MV100	V
8	5	107	111	2	0300	0

T031R5-2TRC66-2

12 260

RADIO SET

AN/TRC-66

657301

5 3 PHASE

V208

112 120

101

KV10

V 75

211 1

105

V 5

MV208

212 236

106

TM11-5820-222-35

6 161

RADIO SET

AM/TRC-68

AM/VRC-24

651200

101	212 103	V253	V20	50/60 CPS 300 WATTS
102	211 22	V 30	V20	26.4 V NOMINAL
103	211 02	300	V 25	
104	212 042	V253	V 1	

694500 AN/ULT-12 41960 TRAINER RADAR TM11-6940-205-15

101	212 105	V120	V10	500 WATTS
103	212 567	V 693	V10	
104	211 0	V300	V 25	NEGATIVE AND POSITIVE
106	211 8	V520	V 25	
107	212 63	V115	V10	
108	217 13	V 45	V10	PEAK TO PEAK ON SCOPE
109	213 15	V 42	V10	PEAK TO PEAK ON SCOPE

	6	AN/VRC-12	RADIO SET	011259	AVCO MFG CORP
8	6 101	111	255 V		INPUT VOLTAGE
8	6 104	115	20 UV 20 UV		RF AMPLITUDE
8	6 105	215	005 V		5.65 MC
8	6 108	211	01 V700 V		DC VOLTAGE
8	6 110	221	20 MA180 MA		DC CURRENT

609300 CU-947/GR

3 159

ANTENNA COUPLER

111 0 V

101

T031R1-2GR-142

7M12-6465-200-35

69059

RADIACMETER

IM-108/PD

634675

101	111	13	V
102	111	104	V

T031R2-2FRC10-26

62959

RADIO TRANSMITTER

T-265/FRC-10

657304

101	112 216	V244	V 5
102	112 113	V117	V 5
103	211 435	V 42	KV 5
104	212 14	V 105	V

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